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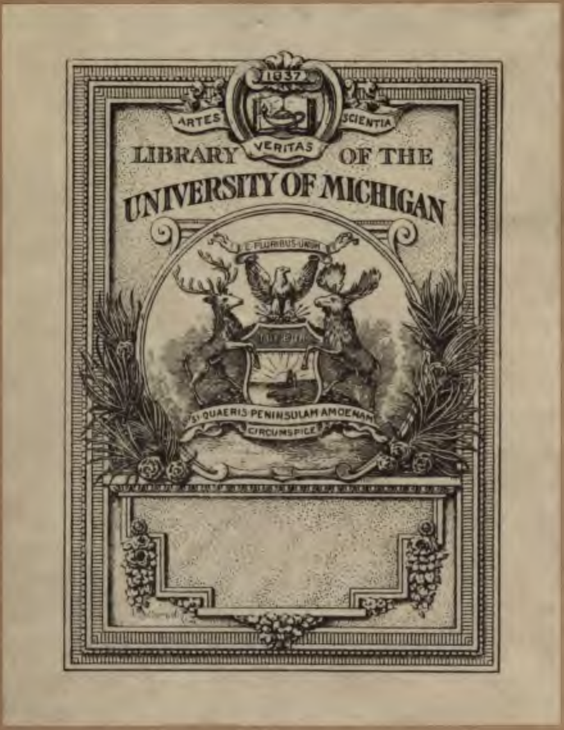

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PROCEEDINGS

OF THE

ROYAL GEOGRAPHICAL SOCIETY.

46418

OB TERRAS RECLUSAS.
ROYAL GEOGRAPHICAL SOCIETY
OF LONDON.

VOL. XII.

SESSION 1867-8.

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[illegible]

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PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED JANUARY 18TH, 1868.]

SESSION 1867–68.

First Meeting, 11*th Nov.*, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*His Imperial Highness Ismail Pacha, Viceroy of Egypt*, was elected an Honorary Member of the Society. *Rev. Andrew A. W. Drew*, M.A.; *W. Herbert Evans, Esq.*; *Sir Henry Bartle E. Frere*, K.C.B., and *Rev. John Graves*, were elected Fellows.

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Hunters of the Hamram Arabs,' by Sir Samuel Baker. Presented by the Author. 'Medical Report on the Kingdom of Shoa.' 'Reise nach Abessinien, den Gala-Landern Ost Sudan und Chartum, in der Jahren 1861-1862,' Th. von Heuglin. Illustrations and map. Presented by the Author. 'Die Sprache der Bari in Central-Afrika.' J. C. Mitterrutzner. Purchased. 'De un viaggio sul fiume Bianca nell' Africa Centrale.' Don G. Beltrame, 1864. Presented by the Italian Geographical Society. 'Die Mande-Neger-Sprachen.' Dr. H. Steinthal, Berlin, 1867. Purchased. 'Der Nil: seine Quellen,' von Dr. T. Kotschy. Presented by the Author. 'Sheep and Stock Farming, South African and Transvaal Republic,' &c. Mr. Blake. 'Atlas du Voyage au Congo et dans l'Afrique Equinoxiale,' par J. B. Donville. Presented by W. D. Cooley, Esq. 'Sud-Afrika und Madagascar:' Justus Perthes' Mittheilungen. Gotha, 1867. Petermann. 'Tamatave to the Capital (Madagascar).' T. Wilkinson. Presented by the Author. 'Neueste Deutsche Forschungen in Sud-Afrika,' von Karl Mauch, H. Hahn, und R. Brenner, mit Karte, 1867. Presented by Dr. Petermann. 'The Company and the Crown, 1867. Hon. J. H. Thurlow. Presented by the Author. 'The Bombay Builder.' J. Tennent, Esq. 'A Journey by Captain Ross along the Mekran Coast between Cape Jask and Gwadur,' 1867; map. Presented by the Commissioner of Sindh. 'Lusiad of Camoens, Dissertation on the Discovery of India.' Presented by S. M. Drach. 'Hugonis Grotii, Batavicæ,' 1632. Purchased. 'P. Gyllii, de Constantinopleos Topografia,' 1632. 'L'Ambassade de la Compagnie Orientale des Provinces Unies vers le Grand Cham de Tartarie.' Leyden, 1665. Presented by Sir W. Parish. 'On Tea Cultivation in Eastern Bengal,' 1867. W. N. Lees. Presented. 'Bibliographia Palestinæ,' Titus Jobler. Leipsic, 1867. Purchased. 'Notes of a Journey through Egypt and Palestine by Mediterranean and Italy, by a Lady.' Presented by S. M. Drach, Esq. 'Reise in Siam in 1863.' 3rd vol. Dr. Adolf Bastian. Presented by the Author. 'British Guiana,'-Paris Exhibition Catalogue. Presented by W. Walker, Esq. 'Barrow's Collection of Voyages,' 1745. Presented by S. M. Drach, Esq. 'Geographia Generalis.' B. Varenius, 1671. 'System of Universal Geography,' 1864. F. Muir. Presented by the President. 'Kurzer Abrige der Geographie Halle,' 1794. Presented by S. M. Drach, Esq. 'On Education of Youth in History and Geography.' J. Clarke, 1736. Presented by S. M. Drach, Esq. 'Compendium Geographicum,' by Golnitz, 1634. Purchased. 'Venezuela; or, the History, Climate, Soil, &c., New Granada, Ecuador,' 1867. 'Report on Interoceanic Canals and Railways between Atlantic and Pacific Oceans.' Maps. Presented by

Admiral Davis, United States. 'Exploracion Oficial, desde el norte de la America del sur, Orinoco, Cassiquiare, Rio Negro, Guyana,' &c. Maps. F. Michelena y Rojas, 1867. Presented by the Author. Charles Sumner, 'On the Cession of Russian America to the United States,' 1867. Presented by J. E. Nourse, United States. 'List of reported Dangers in the Pacific Ocean not recorded in Maps in general use,' 1866. The United States' Navy Hydrographical Department. 'The Republic of Mexico Restored.' M. G. Garzia, Mexico, 1866. Presented by the Author. 'United States' Naval Astronomical Expedition,' vols. 3 and 6, by J. M. Gillis, 1856. Presented by Sir W. Parish. 'On Crania, West Pacific.' J. B. Davis. Presented by Dr. Lamprey. 'L'Exposition Ethnographique, Paris, 1867.' 'Results of Meteorological Observations for 25 years at Hobart Town,' by F. Abbot. 'Suecia.' 'Hispania.' 'Portugallia.' 3 vols., Elzevir editions, 1631. Purchased. 'Residence in Normandy:' Constable's Miscellany, 1831. Presented by S. M. Drach, Esq. 'Adventures in North of Europe,' by Edward W. Landor, 1836. Presented by S. M. Drach, Esq. L'Ile de Crète,' par V. Raulin, Paris, 1867. Purchased. 'Bosnien,' by G. Theommel, Wien, 1867. Purchased. 'Les Travaux d'Amélioration aux Embouchures du Danube;' Galatz, 1867: 'Embouchure de Soulina,' 1867, Leipsic. Presented by the Secretary of State for Foreign Affairs. 'Tea-trade of Russia.' Mr. Lumley, 1867. Presented by the Foreign Office. 'Russia, Moscovia itemque Tartaria,' 1630. 'Den Danske Gradmaaling,' 1867. C. G. Andrée. The Publisher, 'Veröffentlichen Resultate der Recrutirung Geschaftes.' Th. Bischoff. 'Navigation Française et la Révolution Maritime du 14 au 15 Siècle, etc., 1867,' par P. Margry. Purchased. 'Army of Great Britain, 1867.' Presented by Sir H. James. 'Frobisher's Three Voyages.' Hakluyt Society. 'Grönland und die Grönlander.' Dr. Helmes. 'Distribution of Temperature in Lower Regions of Earth's Atmosphere.' H. Hennesy, F.R.S. Presented by the President. 'Siluria; a History of the Oldest Rocks in the British Isles,' &c., by Sir Roderick I. Murchison. Presented by the Author. 'Darmstadt Geologische Specialkarte des Grossherzogthums Hessen.' Maps, plates. 5 vols. 'Notes et Documents sur les Tremblements de Terre, et les Phénomènes Volcaniques des Iles d'Aleutiennes et de la côte Nord Amérique.' 3 vols. Paris. Presented by the Author. 'Coup d'œil général sur le Topographie et la Géologie du Mexique et l'Amérique Centrale,' par M. d'Aoust. Presented by the Author. 'Nivellement de Précision de la Suisse.' A. Hirsch and E. Plantamour, Genève, 1867. Presented by the Foreign Office. Dr. S. G. Blanc's 'Wissenswürdigkeiten aus der Natur und Geschichte der

Erde,' etc. Presented by Dr. H. Lange. 'Killebuttel und das Seebad zu Kuxhaven.' Hamburg, 1818. 'Remarks on Korea,' 1865. Allen Young. Presented by the Author.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING, JUNE 22ND.—The principal maps are marked thus *:—Tracing of the rivers Endeavour and Annan, in Queensland, Australia. Presented by Sir G. Bowen. Native Map of Japan, divided into provinces, and coloured. Road-map from Pekin to Kiachta. Presented by E. C. Bowra, Esq., Customs, at Canton. *Map of the Colorado Territory, United States. Presented by J. Barwise, Esq. *Map of the Argentine Republic, &c. *Map of the Province of Buenos Ayres, 6 sheets. Both presented by Mr. Burgis. Map of Central America. Presented by E. G. Ravenstein. *Map of the World, and one of Asia Minor, in Turkish characters; constructed and photographed by his Excellency Ahmed Vefyk Effendy. *Map of the International Atlantic and Pacific Junction Railway, Nicaragua, as projected by Capt. Bedford Pim, R.N., 1866. Map of Northern Africa, shewing the routes of Gerhard Rohlfs, in 1861 to 1867. Presented by A. Peterman. *Topographical Plan of the Province of Madrid, on 22 sheets, with index and triangulation. Presented by Don Juan de Vila Nova, Professor of Geography, Madrid. *Map of Nubia and Abyssinia, by A. K. Johnston, F.R.G.S. *Photographic copy of the general Map of the United States' Boundary Survey, on 2 sheets, by D. Williams. Presented by Archibald Campbell, U. S. Commissioner. *Danish Chart of the Kattegat, 1867. *Map of Abyssinia. Presented by J. Wyld, Esq. (2 copies). Map of Abyssinia, shewing the Nile tributaries, by Sir S. Baker. Map of Abyssinia, by Dr. Beke. Both presented by E. Stanford, Esq. *Map of Abyssinia, by the Topographical Depôt of the War Office. Presented by Sir. H. James, Director. *Map of the Isthmus of Suez, by M. Voisin, Director. Purchased. Map of Nova Zembla. Map of United States of America. Both by A. Petermann. *Map of British Columbia, prepared under the directions of Capt. Parsons, R.E. Presented by the Author. Also a section of the above, and tables of Meteorological Observations. *Admiralty Charts, 36 sheets. *Ordnance Maps, 496 sheets, up to date of publication.

The PRESIDENT opened the Session with the following Address:—

GENTLEMEN,—IN opening this Session, the first subject to which I have to allude is the progress of the Searching Boat-expedition which Her Majesty's Government, at the representation of our Council, has sent out in order to obtain authentic tidings of Dr.

Livingstone. As I announced to you in my Anniversary Address, the Boat-party, under the leadership of Mr. Young, and provided by the Admiralty with every requisite, set sail from Plymouth on the 11th of June. At the Cape of Good Hope, Mr. Young received great assistance from the Authorities, obtaining a whale-boat for the carriage of his stores, and the addition of two native Africans to his party; one of whom could speak the Zulu language, and would be most useful as an interpreter when the expedition arrived at the head of Lake Nyassa. Two letters will be read to you, giving details of the progress of the party up to their arrival within the mouth of the Zambesi. Meantime it is satisfactory to learn that they made a very quick voyage from the Cape to the Kongoni entrance of the Zambesi, accomplishing the distance in 9½ days; and, after obtaining a negro crew, departed on the 27th of July up-stream on their venturous errand.

I have so often explained to you the cause of my scepticism on the painful subject of the reported death of Livingstone, produced chiefly by my estimate of the mendacious character of the only man who says he witnessed the catastrophe, and also from that person having given two accounts of it—the one entirely contradicting the other, that I am sure you feel with me, it was due to the reputation of our body that we should not attach credence to such a story, and that we should wait until some valid proof of the death of my illustrious friend had been obtained. I therefore repeat what I said when the expedition left our shores, that we must abide patiently till the second—perhaps the third—month of the coming year, when Mr. Young's party, having returned from the upper end of Lake Nyassa, shall have set our painful suspense at rest. If we should then happily learn that Livingstone was not killed at the spot mentioned, but had passed on into the interior, why then, if accompanied by a few black men only (which was the case when he carried out successfully all his earliest great discoveries), I have such faith in his unyielding energy and never-failing resources—that, though he may have had no means of communicating with the coast, he may, after an interval of a year or more, reappear and rejoice us with an account of his northward exploration along, and perhaps far beyond, the Lake Tanganyika.

In regard to the geography of Abyssinia, to the consideration of which public attention is re-awakened, there will be read to you this evening a condensed sketch of the expeditions to that country, in the fifteenth, sixteenth, and seventeenth centuries, by our great precursors in bold adventure—the Portuguese, as prepared by our

Secretary, Mr. Clements Markham. On this subject, permit me to remind you that twenty-four years have elapsed since—when occupying this Chair—I brought before the Society as much knowledge respecting Abyssinia as it was in my power to collect; basing it, naturally, on the then recent researches of our associate Dr. Beke, which justly gained for him a wide reputation and our Gold Medal.

After mentioning the names and exploits of forty-two travellers who had been in Abyssinia in the forty years preceding the year 1844, I stated that of all those who, since the days of Bruce, had visited that country, Dr. Beke was then the individual who had most improved our geographical acquaintance with it. Since that time it has been the good fortune of our Society to boast of another most successful explorer of Abyssinia in the person of our associate Mr. Mansfield Parkyns; and, after the very trying difficulties which he surmounted, and the remarkable events he witnessed, no one can any longer see reason to doubt the truthfulness of any of the descriptions by Bruce. In fact, all foreign travellers who have visited Abyssinia, whether the brothers D'Abbadie, or their successors, MM. Ferret et Galinier, MM. Combes et Tamissier, or M. Th. von Heuglin, who has just issued the narrative of his journeys in 1861 and 1862, confirm the earliest impressions we received from our countryman Bruce respecting this extraordinary region.

During the vacation which has passed, I invited the attention of Her Majesty's Government to the desirability of sending out some men of science with the military forces about to proceed to Abyssinia, in order to procure more accurate knowledge respecting the geography, geology, and natural history of the interior of that country than we now possess; and I ventured to hope that, although in the great expedition to Turkey and the Crimea, a similar suggestion, which was then made, met with no attention, it would not be overlooked on this occasion. I am happy to say that the suggestion was approved of by Lord Stanley and Sir Stafford Northcote, the Ministers under whom the expedition originated. Whilst it has been thought best by Her Majesty's Government to take the greater number of such men of science from Bombay, the Secretary for India has been pleased to approve my special recommendation that our Secretary, Mr. Clements Markham, should proceed from hence to act as the Geographer of the Expedition. Although we shall have to regret the absence of Mr. Markham during this session, I am confident that you will agree with me that he could not possibly be better employed in advancing our science than by taking part in this interesting mission; and, judging from his antecedents in South America and British India, we may confidently reckon upon him as a correspondent who will give us a masterly geographical sketch and a vivid description of the region he may traverse.

I may also mention that Mr. W. Blanford, the Deputy Superintendent of the Geological Survey of India, who has been named to accompany the expedition from Bombay, is as sound and clear-sighted a practical geologist as could have been found at home; for he was educated in the Royal School of Mines, and has since produced excellent memoirs on parts of the Himalaya Mountains and Western and Central India.

Lieutenant St. John, one of our Fellows, who has already given us good information respecting Persia, has laid before us a memoir, which will be read at an early meeting, on the elevation of the country between Teheran and Bushire. This able officer, who has been employed in establishing the new line of electric telegraph in Persia, is, I am happy to hear, to be one of those who will accompany the Abyssinian expedition.

It is also gratifying to reflect upon the fact that, on this occasion, the Government has made every endeavour to bring together all procurable data respecting the various practicable routes across the country—a task which has been most efficiently completed by Lieutenant-Colonel Cooke, R.E., of the Topographical Department, under the direction of Sir H. James; each route of the numerous travellers being laid down in the first instance on Keith Johnston's new map. This has been followed by the completion of a new map of a large tract of Abyssinia, the result of an assiduous sifting and comparison of all previous documents, combined with hitherto unpublished materials. In the mean time, and in expectation of valuable additions which will be made, the public has now the advantage of consulting the general maps of Abyssinia, issued by our associates Mr. Keith Johnston and Mr. Wyld; and also two detailed maps, just received from our assiduous foreign contributor, M. Petermann, one of which exhibits, on a large scale, the features of the country between Massowah and Halai, in which the first operations of the British army will take place.

At the last meeting of the British Association, held at Dundee, the reputation of the Geographical and Ethnological Section was well sustained by the eloquent address of the President, Sir Samuel Baker. The very attractive volume which he has since published, entitled 'The Nile Tributaries of Abyssinia,' will, I venture to anticipate, have a reception from the public which will go far to rival that of his previous great work, narrating the discovery of Lake Albert Nyanza; for many readers will prefer his lively description of the picturesque and bold Arab hunters, and the diversities of the wild animals of their country, to the journal of any wanderings among the inferior negro races on either side of the equator. The important observations of Sir Samuel, which shew that the true agricultural wealth of Lower Egypt is due to the fertile mud brought down by the Atbara and the Blue Nile with its affluents, as contrasted with the effects of the grander drainage-system of the White Nile, accords exactly with that which the geographer and geologist might expect who compares the physical outline and structure of the two regions in question. All the equatorial countries through which the White Nile flows, as well as those in which its great internal feeders or water-basins lie, are made up of hard, crystalline, and sandstone rocks, with scarcely the trace of lime, and few or no volcanic rocks; Abyssinia, on the contrary, and particularly all its western portions from which the Atbara and the Blue Nile flow, is made up of rocks containing a great variety of mineral substances, to a great extent of volcanic origin, which decompose into rich and valuable mould.

Then, again, we know that these mud-bearing affluents of the Nile descend in comparatively short courses and with great rapidity from the mountains of Abyssinia, which are very much loftier than the very distant plateau-lands in which the great and distant feeders of the White Nile lie; and in these data we see abundant reasons, whether geographical or geological, to sustain the view adopted by Sir Samuel Baker.

Among the papers which have been received at our office, and will be read to you at the earlier Meetings of the Session, I may observe that some of the most important, in a geographical point of view, relate to different portions of the Isthmus of Central America, and to surveys which have had for their object the discovery of lines of traverse, whether for railways or ship-canals, between the Atlantic and Pacific Oceans. One of these papers is by Mr. Collinson, a young engineer employed in the exploration of a line of route across the wildest parts of Nicaragua, in which he was engaged under the direction of Captain Bedford Pim, R.N., and which may be expected to throw much light on the physical geography of that region. On this subject, but more particularly relating to the winds and currents of the sea-coasts of Nicaragua, an interesting paper was read by Captain Maury before the Geographical Section of the British Association at Dundee; and I may venture to hope that this distinguished hydrographer will communicate to us a memoir on the same subject in the course of the Session.

Another memoir by M. de Puydt on that portion of the Isthmus of Darien which lies about 60 miles to the southward of the tract reported upon, some sixteen years ago, by Mr. Gisborne, will doubtless excite much interest, particularly as the author shows that the dividing ridge between the Atlantic and Pacific Oceans there attains a maximum of only 120 feet above the sea-level.

We also hope to be soon favoured by Mr. Whymper with an account of the excursion which he has made to Greenland, and from whence he has just returned, having arrived at Copenhagen in a Danish vessel on the 22nd of last month. His projected sledge-journey into the interior of that glacier-covered land has been rendered less extensive than he had hoped, by obstacles which it was impossible to foresee; the chief of which was an epidemic, which has carried off from 8 to 10 per cent. of the population. The secondary objects of the expedition, however, as will be related to you, have been effectively carried out, and large collections have been made of the fossil and recent plants of the country, the marine animals of its shores, and stone and flint implements of its former inhabitants. It gives me much pleasure to announce that the British Association for the Advancement of Science have voted the sum of 100*l.* to Mr. Whymper to support his bold adventure, undertaken originally entirely at his own cost, and in the hope of throwing fresh light upon our knowledge of the present vegetation and animal life in the interior of that snow-clad region, as well as of explaining its former much warmer climate, whence plants, now fossil, which grew in these Arctic latitudes, must have derived for their existence a much greater amount of heat.

Lastly, gentlemen, let me congratulate you on opening this Session with an unusually long list of new candidates for enrolment as Fellows, among whom are many persons of note at home, headed by the noble Duke who now presides over the British Association, and of men highly distinguished in our Colonies led on by Sir Bartle Frere.

It is by such accessions, derived from all classes of our countrymen, that the truly British and cosmopolitan character of our Society is maintained.

The following letters were read, relating to the progress of the Livingstone Search Expedition:—

"H.M.S. *Petrel*,
"Off the River Kongoni, July 26, 1867.

"DEAR SIR,

"I have the honour to report that we sailed from the Cape, in this ship, on the 16th inst., and have had the good fortune to make a very quick passage

(9½ days). I have received every assistance from the senior officer at the Cape, and also from Commander Gordon of this ship. I obtained one whale-boat complete from the dockyard at Simon's Bay; but during the voyage, having had reason to fear a want of carriage for all our stores, Commander Gordon, on my application, has had a second whale-boat prepared to go with me if I required it; and a few additional items of stores and provisions have been supplied me. I have also volunteered two Kroomen and an English stoker from this ship, feeling it advantageous to add to the strength any reliable party. One of the Kroomen, or rather Africans, carried originally from Delagoa Bay, speaks a little Portuguese. The stoker, who is also a seaman, I have taken with a view to putting him in charge of the third boat. In my letter from the Cape, I forgot to mention that I succeeded in finding the two boys whom we liberated from slavery, and brought there in the *Pioneer;* they have willingly joined us, and are likely to be very useful as interpreters.

"On our arrival this morning at the East Luabo, we found the entrance completely changed and quite impassable; so we retraced our steps, and anchored off the Kongoni, where the bar seems fairly smooth. Here also the change is almost marvellous, Pearl Island having almost completely vanished, and the entrance become tortuous. We hoisted out the boat, which has taken much longer to put together than was anticipated (nearly three days); but finding her leaking at some of the joints, we got her in again to remedy the evil, and expect to have it ready to cross the bar at high water to-morrow.

"I have not altered my views respecting the probable time of our return to the mouth of the Zambesi, and have written asking the senior officer at the Cape for a ship to meet us on the 1st December.

"In conclusion, I am happy to say that, as far as I can judge, we are supplied with everything we can need, are all in the enjoyment of perfect health, and look forward confidently to a successful accomplishment of our undertaking.

"I have the honour to be, sir, your most obedient servant,

"E. D. YOUNG,
"*In command of Livingstone Search Expedition.*"

"To Sir R. I. Murchison, Bart."

"H.M.S. *Petrel,*
"Simon's Bay, 15th August, 1867.

"SIR,

"I HAVE the honour to report that, in pursuance of your orders, I left Simon's Bay on the night of the 16th July, with Mr. Young and party. I carried a strong fair wind till midnight on the 18th July, when I had to raise steam for an hour or two, to communicate with Algoa Bay.

"Receiving no news of importance, I immediately proceeded, keeping the same fair wind, which increased to a strong gale, till past Natal, on July 21st. From this time I experienced light winds and calms, and I had to steam the remaining 600 or 700 miles. I anchored off the Kongoni mouth of the Zambesi at midnight on the 25th July, having made the passage, including the stoppage at Algoa Bay, in 9 days and 3 hours.

"Next morning Mr. Young being unable to recognise the place, I steamed for some 20 miles to the eastward, seeking either the Luabo or Kongoni entrance. I finally returned to my first position, which was indeed just off the the Kongoni mouth, though Mr. Young had failed to recognise it, from the alterations that had taken place—Pearl Island having been completely washed away. Great changes had also taken place in the other entrance; the East Luabo appearing quite impracticable. On the passage up, on Mr. Young's requisition, I furnished him with our whale-boat, in addition to the one from the dockyard, and a few other miscellaneous stores. I also allowed my two

Kroomen (who it appears are natives of this part of the coast), and on his written requisition a stoker, named Arthur Stacey, to accompany him as volunteers, checking them on the ship's books as lent to the Expedition. On anchoring the second time off the Kongoni mouth, the steel boat which we had been employed in putting together during the previous three days, was hoisted out, but was found to leak so considerably that we had her lifted in again immediately to remedy the defect. The tide did not serve for crossing the bar till the next forenoon, by which time we had reconnoitred the entrance, and had all the boats, including the two cutters, loaded and ready to go in over the bar, in charge of Mr. Berners, the senior lieutenant. They all passed safely in, being directed by myself at the masthead with pre-arranged signals. In the afternoon Mr. Berners returned with the two cutters and the extra crews who had taken the boats in, and reported that Mr. Young having, with unexpected good fortune, met some natives at the point, who agreed to man his boats, required no further assistance from us. On the same evening, 27th July, I started on my return, using a very little steam to gain an offing—wind, swell, and current all setting on shore.

"Commander GORDON."

"To Commodore Henry Caldwell, C.B."

The following paper was read:—

On the Early Portuguese Expeditions to Abyssinia. By CLEMENTS R. MARKHAM, Esq., Secretary R.G.S.

THE author stated that as soon as the aspirations of Prince Henry of Portugal had been fulfilled by the discovery of the Cape of Good Hope, by Bartholomew Dias, in 1487, King John II. saw the importance of collecting information in the East, with reference to the possibility of turning the rich trade of the Indies into the new channel; and he was also anxious to discover the dominions of the Christian ruler called Prester John, who had been reported by Marco Polo to reign in the far east. Two Portuguese, named Alfonso de Payva, and Pedro de Covilham, were selected for this service. After a long journey through the East, Payva died at Cairo; but Covilham, having heard that a Christian ruler reigned in the mountains of Ethiopia, and having gained no tidings of any other Christian king during all his wanderings, naturally concluded that the Ethiopian potentate was he for whom he had so long sought in vain. So, in pursuance of his instructions, and undeterred by the dangers of the journey, he penetrated into Abyssinia, and presented himself at the court of the Negus, which was then in the Southern Province of Shoa, in the year 1490. He delivered the King of Portugal's letter to Prester John to the Negus Alexander; but he was detained by this prince and his successors, and was never allowed to leave the country. Covilham, as a young man, had distinguished himself both in the war with Spain and in Morocco, and was an officer of capacity and great courage. He married in Abyssinia, obtained great influence at Court, and survived for many years, for he was still living when the Portuguese embassy arrived in 1520.

In 1507, Ebana Denguel ("Virgin's incense"), or David, ascended the throne of Ethiopia, with the title of Wanag Segued ("Precious gem"). He was very young, and his grandmother Helena assumed the regency. Hearing of the great power of the King of Portugal, from Covilham, she sent an Armenian, named Matthew, with a letter from the Negus David to King Manuel, who was well received at Lisbon; and a return embassy was despatched under Duarte Galvano, who died on the voyage. The advisability of opening a communication with Abyssinia was not lost sight of by the Portuguese Viceroy at Goa, and the death of Galvano only delayed the despatch of an embassy.

In April, 1520, the Viceroy led a fleet into the Red Sea to attack the Turks, taking Matthew, the Armenian, with him. He anchored at Massowa, where he saw the Bahar-Nagays, or Abyssinian Governor of the province bordering the sea, and some monks from the convent of Bisan, in the adjacent mountains. The leading members of the embassy were Rodriguez de Lima, a haughty, quick-tempered young officer; Father Francisco Alvarez, a priest, whose quaint narrative is the earliest and not the least interesting account we possess of Abyssinia; and João Bermudez, the Secretary, a bold and intriguing man, who was much mixed up with the subsequent history of the country.

The Portuguese went first to the monastery of Bisan, on the seaward slope of the Taranta Mountains, and crossing that range, arrived at the town of Barua, or Debaroa, on the eastern bank of the River Mareb, which was then the capital of the province ruled over by the Bahar-Nagays, or Lord of the Sea. The route of the embassy seems to have been nearly the same as that by Kiaquor, which Dr. Beke describes as a gradual and easy road, and well watered. After leaving Debaroa, they crossed the Mareb to Axum, and went thence through the district of Angot, by Lalibela, and the Rock of Geshen, to the court of the Negus David, in the province of Fatigar. The embassy was detained for six years in Abyssinia, during which time Father Alvarez had an excellent opportunity of acquiring a knowledge of the country, and of the manners of the people. His narrative was afterwards published at Lisbon, in 1540, and a copy of the original folio edition is in the British Museum. Ramusio gave an Italian version, and a French one was printed at Antwerp, in 1558. The indefatigable Hakluyt obtained an English translation, which is one of the quaintest and most pleasant bits of reading in the 'Pilgrims' of Purchas.

Soon after the departure of the Portuguese, Abyssinia was invaded by armies of Mahommedans from the countries of Adel and Hurrur on the south, and the Negus David was at last obliged to seek refuge in the almost inaccessible mountain of Damo, in Tigre, where he died in 1540,—his son and successor, Claudius, having taken refuge in a fastness of Shoa. In this state of affairs David had resolved to seek aid from the Portuguese; and the better to ensure their support, embraced the Romish faith. The physician, Bermudez, whom he had detained in Abyssinia, was sent first to Rome, and thence to Lisbon, to request military assistance. The King of Portugal did not hesitate, and Bermudez was despatched to Goa, with orders to the Viceroy to send an expedition in aid of the Negus.

In 1541, the Viceroy, Estevan de Gama, entered the Red Sea, and the expeditionary force was landed at Massowa; its command being entrusted to the Viceroy's brother, Cristoforo de Gama, accompanied by Bermudez. It consisted of 450 Portuguese musketeers, and six small field-pieces. Starting for the interior on July 9th, 1541, the little army marched for six days, suffering much from the want of water and the means of carriage, for they had only a few camels and mules which carried the artillery. At many places where the ground was rocky the camels were useless, and the men had to carry the burdens on their own backs. At the end of the seventh day they arrived at so steep a mountain that it took them the whole day to reach the summit. Here they rested for a time, and refreshed themselves with the cool breeze and the delicious springs that descended from the heights. On reaching Debaroa, Cristoforo de Gama united his forces with those of the Bahar-Nagays, and was joined by the Queen-Mother.

Mohammed Granhe, the terrible Moorish general, was in the province of Tigre, prepared to dispute the advance of the Portuguese with 1000 horse, 5000 foot, 50 Turkish musketeers, and some artillery. De Gama's army consisted of 450 Portuguese and about 12,000 Abyssinians, badly armed with spears and shields; but his own energy and dash at first carried all before him. He took the mountain fortress of Amba Zanet by storm, and during April, 1542, defeated Granhe in two pitched battles. He afterwards crossed the Tacazze and surprised the famous hill-fortress known as the Jews' Amba. But during the winter Granhe received reinforcements, and on August 28th, 1543, he defeated the allied army in a pitched battle. Badly wounded, De Gama was with difficulty prevailed on to accompany the Queen-Mother and the rest in their flight, and lagging behind was captured by the Moors and beheaded. Only

300 out of the 450 Portuguese escaped from this fatal battle. They retreated to the Jews' mountain, where they were joined by the young Negus Claudius, and in February, 1544, gained a brilliant victory over the Mahommedans, in which Granhe himself was shot by a musketeer. The Negus was eventually slain in a battle with the Mohammedans of Adel in March, 1559, and his body-guard of eighteen Portuguese were killed to a man in their gallant attempt to defend him. Yet the Portuguese were treated with the basest ingratitude. They married natives; and Dr. Beke tells us that to this day their descendants are called Francis, at Karaneo and in its vicinity.

The Jesuits who accompanied Bermudez fixed their head-quarters at Fremona, in Tigre, where they erected a church and fortified convent. The mission underwent numerous vicissitudes during many years, until the Jesuits were finally expelled. They made numerous futile attempts to fix the latitude of Fremona with an astrolabe, always being more than thirty miles out in their reckoning. As missionaries, the Portuguese Jesuits were eminently unsuccessful. The people preferred their own traditional form of Christianity, hated innovation, and insisted upon having a Coptic, not a Roman, Abuna. Bermudez eventually left the country, and reached Lisbon after a residence in Abyssinia of more than 30 years. His narrative was published at Lisbon in 1565. There is a copy in the British Museum Library, and an English version is given in the second volume of Purchas' 'Pilgrims.'

In 1604 Father Francisco Paez arrived at Fremona, who was by far the ablest European that has yet resided in Abyssinia. He added to great tact and judgment, and an extraordinary power of influencing the minds of all classes of men among whom he was thrown, an amount of ability which enabled him to succeed in nearly everything he undertook, from turning a stone arch to ruling the heart of a king; and a quickness of apprehension which amounted to genius. Under him the Jesuit mission rose into high favour, and both the Negus and his brother Sella Christos embraced the Romish faith. This gave rise to a rebellion, headed by the Coptic Abuna Peter, who was defeated and killed in a battle fought amongst the mountains of Samen. The rebel cavalry were seized with a panic, could not stop themselves, and 600 men and horses galloped over a precipice and plunged into a frightful abyss. While Paez lived the disputes between the Abuna and the Jesuits were kept within bounds. But the most lasting memorials of his genius are to be found in the ruins of churches, palaces, and bridges erected under his superintendence. He taught the workmen how to cut and lay the stones. It is a proof of the stiff-necked savagery of the Abyssinians, that, with all these models under their very noses, they should still worship in churches and live in huts of which a West-coast negro would be ashamed. The good Father died after a residence of 19 years in the country. He left a narrative of his labours, of which there were many copies in the Jesuit colleges, but unfortunately it is not yet in an accessible form. There is a copy in the British Museum.

Father Alfonso Mendez was sent out by the Pope as the new Patriarch in 1624. He was accompanied by Father Lobo, and landed at Baylur, on the coast inhabited by the Dankâli tribes, approaching the highlands by a route which has only once been traversed by a European (Mr. Coffin) since their time. The Jesuits were finally ordered to leave the country by the Negus Facilidas in 1633.

The Paper will be printed entire in the 'Journal,' vol. xxxviii.

The PRESIDENT, in returning thanks to Mr. Markham for his luminous paper, said they must all wish him success in his geographical mission in connection with the Abyssinian expedition. He must say it gave him the most sincere gratification that Count Lavradio, the representative of the Portuguese nation, was present, and had heard the narrative of the exploits of his countrymen, who had been our precursors in India and in Abyssinia. His Excellency was a descendant of the first Viceroy of India, and it was peculiarly gratifying to him to know that Count Lavradio was founding a Geographical Society in Lisbon upon the plan of our own. He would now call upon Dr. Beke, who more than forty years ago received the Gold Medal of the Society, and who at that period threw more light upon the subject of Abyssinia than any traveller since the time of Bruce.

Dr. BEKE bore testimony to the general accuracy of the paper respecting the explorations of the Portuguese in the sixteenth century, and, having pointed out the error in all the maps with respect to the route from Hanfila (Amphila) to Senafé, taken by Coffin, explained the route now proposed to be followed by the British troops. They would not land at Massowah, but at Zulla, or Adulis, in Annesley Bay. The ruins of Adulis are to the north of the Hadás; Zulla is to the south of the Hadás. It was the route which he had himself recommended. He visited this place with his wife at the beginning of last year, for the purpose of exploring this entrance into Abyssinia, and he was happy to say that, after every other route had been examined, this had been selected.

The PRESIDENT asked if there was water at all times in the Hadás?

Dr. BEKE said, during the dry season the Hadás now has no water in the lower portion of its channel; but down one-half of its course, from its head at Tohónda as far south as Hamhammo, a well-known camping-ground of the caravans, water is met with at certain spots all the year round; and even when at the driest, wells dug in the sandy bed of the river afford a constant and copious supply of that necessary fluid. During the rains in the upper country the floods of the Hadás, and of its tributary the Aligáddi, find their way down to the sea, and often render the river itself impassable. In February, 1866, he found the dry bed of the river between Adulis and Zulla to be 50 or 60 yards broad; and about a mile nearer the sea, they came to wells sunk in the sandy soil, at which numerous horned cattle were being watered. From Zulla they went five or six miles further inland, and had the natives been well disposed, they would have gone on to Hamhammo, which was not more than 6 miles from their extreme point; but though disappointed in this, they succeeded in finding the road from Zulla to Hamhammo, which, instead of following the circuitous course of the Hadás, goes directly across the country, making the distance of Hamhammo from the sea-coast not more than 16 geographical miles; from the wells near Zulla it is only 13 miles. In the following month of March they went from Massowah into Abyssinia by the caravan road taken by Bruce, Salt, Rüppell, Krapf, and other travellers; and in May they returned to the coast by the same road. In doing so they had to traverse 26 miles of low and barren country between Arkiko and Hamhammo, where no regular supply of water is to be had; and instead of continuing up the bed of the Hadás to its source, they stopped at about 10 miles below Tohonda, and turned up the steep side of the valley by the pass of Shumfaito. It occupied seven days' slow travelling between Arkiko and Halai on the road up, including stoppages, and four days in returning. The actual time they were on their mules' backs was 25 hours going from the sea up into Abyssinia, and 20¾ hours coming down. Of these intervals, respectively, 5 hours were spent in ascending, and 3½ hours in descending, Shumfaito. At Halai, at an elevation of upwards of 8400 feet, they had reached the table-land of Abyssinia, and yet they were so close to the coast—little more than 20 geographical miles—that they could perceive the sea beyond Arkiko to the north, and hear the firing of cannon at Massowah; while to the south and south-west for hundreds of miles extended the Abyssinian table-land, of which Amba Magdala is a detached spur, at a lower elevation than the table-land itself, approachable by a practicable road through Agame, Enderta, Bora, and Woffla, without crossing any large river, a considerable portion of which road had been trodden by himself.

The PRESIDENT: When you have got the army on the table-land, do you not see any great difficulty?

Dr. BEKE said, not if they kept clear of the rivers, which ran in valleys 3000 and 4000 feet deep. If an army crossed the rivers, they would have to go down one side of the valley, and ascend the other; and it would take them as long to march in that way as it would to go round the heads of the rivers on the table-land. Moreover, if they kept on the table-land, they could drop down upon any part of the country they pleased, between the valleys. The passes at the entry into the table-land were very narrow, and could be defended by a small body of troops; but there were no troops there, and the natives who held the passes could easily be disarmed by a bribe.

In answer to Mr. CRAWFURD, Dr. BEKE said he had not visited Magdala; he had visited Debra Tabor, which was about 40 days' march from the coast, of 10 miles a day. Magdala was somewhat nearer. An Abyssinian town was a mere collection of huts. Wherever the king made his camp, that became the capital of the country. If he remained there for a considerable time, the people would build a church of wattle and mud, or make it stronger with dry earth and straw. There were no stone houses except those built by the Portuguese. The convents were built of mud walls; of what few manuscripts there were in the convents, copies had been brought mostly to England.

Sir HENRY RAWLINSON, M.P., having referred to the various routes which had been followed by different travellers penetrating Abyssinia from the sea-coast, said that Colonel Merewether, who had good opportunities of obtaining information, was strongly in favour of entering by Amphila Bay. Dr. Beke, on the other hand, had first pointed out the advantages of Adulis, and for this he deserved great credit, as well as for having made known the physical configuration of Abyssinia. He had indeed rendered great service by drawing attention to the real nature of the so called precipitous passes, showing that they were merely river-beds. All the rivers came down from the high table-land, and formed themselves into precipitous gullies of greater or less depth, some of them as much as 3000 feet in depth. Any army, therefore, which attempted to march at right angles to the line of the rivers would have to cross a succession of these precipitous gullies, descending 3000 feet on one side to ascend 3000 feet on the other. It was this circumstance which caused the character of the country to be regarded as so difficult in a military point of view. But if the troops kept close along the eastern edges of the table-land, they would get round the head-waters of these rivers, and avoid the difficulty of crossing them, and they could then diverge into the interior at any point they liked, between the rivers, along the shoulders which run down from the crest of the table-land. With regard to the point of entry, he quite agreed with Dr. Beke that Zulla or Adulis was much preferable to Massowah. Th ancients were very good practical geographers, and they always selected the most favourable point for their settlements. They chose Adulis, because a river there fell into the sea, by which they could pass on to the table-land of Abyssinia. Adulis was a port of great importance in the time of the Ptolemies; and in the fifth century, when the Greek monk Cosmos visited it, he found the throne of a Ptolemy still standing on the sea-shore, with a most important historical inscription engraved on it, which he copied. He did not know whether Dr. Beke had been to the ruins of Adulis.—(Dr. Beke: Yes). Was there any trace to be found of the old throne?—(Dr. Beke: No). Adulis and Axum were the only two places that he had ever heard of where ancient remains were to be found.

Dr. Beke.—There is the Greek town of Senafé.

Sir Henry Rawlinson said wherever there were any Greek towns it was important to gather whatever relics might still be found there. Such remains were doubtless confined almost entirely to the sea-coast, because it appeared that in the interior of Abyssinia the people had never taken in any way to working in stone. Axum, Senafé, and Adulis belonged to a group of stations adjoining the sea. At one time there was a perfect howl of desperation in the periodical press of this country at the dreadful climate which our troops were going to encounter in Abyssinia. But as far as he could make out, Abyssinia was in reality one of the healthiest countries in the world. At any rate, compared with India, the highlands of Abyssinia were excessively healthy, so much so that he thought it likely that during our occupation of the country some points might be selected as a sanatorium for India. Another reason for selecting Adulis for debarkation was the short distance thence to the fine climate of the highlands. The plan of Sir Robert Napier was understood to be, to establish a depot on the nearest point of the high table-land from Zulla, a distance of 40 or 50 miles, and to concentrate the troops upon the plateau, whence negotiations could be kept up with the surrounding people, and a base of operations established for a further entrance into the country. As far as climatic or physical or military difficulties were concerned, he looked upon them as not very great. The political difficulties were another matter. For instance, if the captives were not forthcoming, the natural question would be, What are we to do? If they were taken away from Magdala, where were we to follow them? These points, and many others, would cause difficulty in the future, but they were points which did not immediately concern the Geographical Society.

Lord Houghton said he thought the Government would be severely questioned as to whether all the advice which they could receive from Abyssinian travellers had been absolutely exhausted; whether Baker, Dr. Beke, and others had been consulted, and their advice taken and acted upon. He trusted that Sir Roderick Murchison, who, as representing the Geographical Society, was a real power in the matter, had been fully consulted. He said now, and he should say it hereafter, that if all the information and intelligence which the Geographical Society had at command had not been brought to bear, the Government would have incurred a very grave responsibility. For himself, he was personally interested, having travelled many years ago to Upper Egypt with Mr. Mansfield Parkyns, who went forward and lost himself for five or six years, utterly unknown to European cognisance, in that mysterious country. Had Mr. Mansfield Parkyns been fully consulted, or any of the travellers in connection with the Society, as to whether the release of the prisoners could not be procured by indirect means? 100,000*l.* given for this object would be unimportant in comparison with the cost of an expedition.

The PRESIDENT said, as far as he knew, almost all the persons capable of giving advice, including Dr. Beke, had been consulted.

Dr. BEKE.—I have given information and advice, but have not been consulted.

The PRESIDENT said, at all events, the only suggestion which he ventured to offer during the recess, when he could not call together the Council, was immediately attended to by both the Ministers who have this expedition under their control. They immediately approved of scientific men and travellers being consulted; and they immediately directed the Topographical Department to make researches into all the travels that had ever been made, and to lay down all the different routes. As far as he had the means of judging, no expedition had left our shores in which greater pains had been taken, both on this side of the water and at Bombay, to bring together all the scientific knowledge they could respecting the country to enable the expedition to succeed.

Mr. DANBY SEYMOUR, M.P., said his object in rising was simply to answer the question put by his relative Sir Henry Rawlinson, When Sir Robert Napier got into Abyssinia, what was he to do? It was no doubt a difficult question to answer, but he did not think it was one impossible to answer. Supposing the prisoners were kept at Magdala, in that case Sir Robert Napier had his task clearly cut out before him. He had got to march by the road chosen for the route of the expedition to Magdala; and when once at Magdala there was no doubt about his being able to take the fort and deliver the prisoners, if they were there. We knew that the prisoners themselves wished that this expedition should be sent out, as their only mode of escape. But suppose King Theodore removed the captives from Magdala, the next question was, Where could he go with them? To the south there was the King of Shoa who had offered his assistance to the British Government, and had sent to Bombay to urge the release of the prisoners. Therefore, if King Theodore went towards Shoa, he would probably be hemmed in between two fires, and finding himself in this critical position he would probably release the prisoners. Next, suppose he did not go to Shoa, but took refuge in his native province of Kwara. There was a powerful rebel chief in arms against King Theodore in Godjam, and if the King attempted to get to Kwara he must pass through this danger. But supposing he reached Kwara, nothing would be easier than for our troops to pass through Kwara; and on his being driven from there he must fall into the hands of the Egyptians, who would not be very far from us. Therefore, when the question was asked, What was Sir Robert Napier to do? the answer was: First of all, he had to release the captives if they were kept in Magdala; if they were taken from Magdala, then, with the assistance of allies offered to the British Government, he had to pursue King Theodore, and it was impossible for him ultimately to escape. Moreover, it should be remembered, that with many other chiefs in arms against him, King Theodore was not the formidable adversary he was, when he was King of all Abyssinia. With regard to the scientific part of the expedition, he hoped it had been constituted in a manner commensurate with the importance of the occasion. To the south of Abyssinia was the country of the Gallas, who were described by Harris and other travellers as a superior and interesting people. It would be a pity if some of the persons attached to the expedition should not be allowed to profit by this excellent opportunity to extend their inquiries into these most interesting regions.

Sir Henry Rawlinson said there was nothing to prevent King Theodore taking the prisoners from Magdala by Dembea into Kwara, his native province, where he was accustomed to take refuge in times of difficulty. If our troops followed him into Kwara, we might certainly drive him on into the hands of the Egyptians; but it was the special object of the expedition to avoid all complicity with the Egyptians, and that he believed to be the main reason for selecting Zulla instead of Massowah as the point of entry, Massowah having always been garrisoned by Egyptian troops, while Zulla was unoccupied.

The President, in reply to Lord Houghton and Mr. Danby Seymour with respect to the selection of the scientific members, said all he could do was to make a suggestion, and that suggestion was at once adopted by the Government. Although the persons that might have been recommended here might have been very suitable men, he knew that he could not have selected a better geologist than Mr. Blanford, who was to be sent from Bombay; and he ventured to say that we could not have found a more proper man to carry out the geographical explorations than their secretary, Mr. Markham. He had only to add that in the library of the Society there existed a large number of works on Abyssinia, which had been thoroughly well classed by Mr. Lamprey, their librarian, and had been consulted by the Government departments.

Second Meeting, 25*th November*, 1867.

Sir RODERICK I. MURCHISON, Bart., K.C.B., President, in the Chair.

Elections.—*William Ferneley Allen, Esq.*, Lord Mayor of London; *G. Andrews, Esq.; Geo. Armitstead, Esq.; the Duke of Buccleugh*, K.G., &c.; *Sir D. Baxter, Bart.; W. J. Best, Esq.; A. M. Bethune, Esq.; J. F. J. Cuttance, Esq.; G. E. Dalrymple, Esq.; J. Donald, Esq.; J. Edward, Esq.; G. E. Forbes, Esq.; R. M. Kerr, Esq.*, Judge of the Sheriff's Court; *the Right Hon. Lord Kinnaird*, K.G.; *W. Lawson, Esq.; Col. Lloyd Lindsay*, M.P.; *John Mackinlay, Esq.*, C.E., &c.; *Duncan McGregor, Esq.; F. M. Metcalfe, Esq.; T. Muir*, jun., *Esq.; J. Paterson, Esq.; Col. Sir Arthur Phayre; C. A. Pierce, Esq.; Rev. A. Raleigh*, D.D.; *A. J. Rhodes, Esq.; E. Spicer, Esq.; Lieut. Steel*, R.E.; *Lieut. O. B. C. St. John*, R.E.; *J. G. Taylor*, H.B.M. Consul in Kurdistan; *J. H. Tritton, Esq.; Capt. F. J. S. Venner; Rev. J. Waite; M. J. Barrington Ward, Esq.; B. Washbourne, Esq.*, M.D., &c.; *Robert Spence Watson, Esq.; M. Woodifield, Esq.*, M.I.C.E.

Accessions to the Library from Nov. 11th to Nov. 25th.—'Nathaniel Pearce—Life and Adventures of, during a residence in Abyssinia from the year 1810 to 1819.' Mr. Coffin's Account of his Visit to Gondar. 2 vols. 8vo., 1831. Purchased. 'Journal of Mr. Blumhardt to Abyssinia, 1838.' The late Travels of S. Gíacomo Baratti into the remote country of the Abisines, 1690. Purchased.

Mons. Poncet—'Voyage to Æthiopia in the years 1698-1699 and 1700.' London, 1709. Purchased. Collection of printed and MS. documents relating to the Slave Trade on the East Coast of Africa, by James Macqueen, Esq. Presented by the Author. Views in Abyssinia, lithographs and photographs. War Office Topographical Department. Presented by the Secretary of State for War. 'Drei Monate in Abyssinia,' von F. H. Apel. Zurich, 1866. Purchased. 'Le Commerce de la France avec le Soudan,' par Henri Stucklé. Paris, 1864. Purchased. 'Phares de la Mediterranéan et le Mer Noir. The French Marine. 'Cesare Moreno.' Extrait à la 'Figaro,' Jeudi, 1867. 'The Negro and Jamaica, 1866,' by Commander Pim. 'Reflections-Kreises Angular Distanzen,' von A. Moritz. Tiflis, 1859. 'Reise durch Kambodja nach Cochin China,' von Dr. Adolf Bastian. 8vo., 1863, Jena. Presented by the Author. 'Nova Zembla,' by J. Sporer, in 'Mittheilungen' of Justus Perthes. Presented by Dr. Petermann. 'A travers l'Amérique Centrale, le Nicaragua et le Canal interocéanique,' par Felix Belly. 2 vols. 8vo., maps, 1867. Purchased. 'Additional Inscriptions from the Hauran and the Eastern Desert of Syria.' 8vo., 1859. By John Hogg, Esq. Presented by the Author. 'Report on the Head-waters of the Rakaia, New Zealand,' with Map and 20 illustrations. 1867. Julius Haast. Presented by the Author.

ACCESSIONS TO MAP ROOM SINCE THE LAST MEETING, NOV. 11TH.—Two Maps of the Northern part of Abyssinia, from Massaua to Halai. Presented by Dr. Petermann. A Map of the Canary Islands. By D. A Map of Nicaragua, by M. de Sonnestern. Presented by the Author.

In commencing the proceedings the PRESIDENT said that all who knew with what tenacity he had opposed the general belief that Dr. Livingstone had been murdered, as reported by the Johanna men, and the conviction he had expressed, that with a few black men only the great traveller might carry out this mission as successfully as when, with Makololo men only, he formerly traversed and retraversed South Africa, would readily conceive with what delight he received the communication about to be read from Dr. Kirk, containing such very hopeful tidings relating to his dear friend. Lord Stanley had since forwarded to him the official despatches sent by Mr. Churchill, our Consul, at Zanzibar, on the same subject. The letter from Dr. Kirk to himself was as follows:—

"MY DEAR SIR RODERICK, "Zanzibar, Sept. 28th, 1867.

"You know that a rumour has been current on the coast to the effect that a white man had been seen near Ujiji. Such a story came to us at a time when it was quite impossible that Livingstone could be the man. Now, however, another narrative has reached us, which, if we believe, it is I think difficult to avoid the conclusion that our distinguished traveller may even yet succeed, and disprove the story given us of his death by the Johanna men.

"A Banian trader at Bagamoyo told me three days ago that he had heard a rumour that some white man had been seen at Wemba; of this he seemed to have no doubt. To-day he brought a native, whom he introduced and left alone with me. I entered into conversation with him, and led him on in an irregular way to give a general account of his journey, without guiding his imagination by any leading questions, determining to meet him again and fill in the details. When I had dismissed him, after my first conversation, it appeared that a ship would sail for Bombay immediately; and not to lose a chance, Mr. Churchill, the Consul, to whom I gave the notes, at once sent all to Bombay, with a request that the substance might be telegraphed to the Foreign Office; viz., 'that we had now some ground for believing that a white man resembling Livingstone had been seen to the south of the Sea of Ujiji.'

"This native, with the rest of the caravan, left Bagamoyo, and passed along the usual trade-route to Wemba and Marungu, where they remained trading for some time, and again returned to the coast. When in one of the villages under Marungu, which is a region governed by several chiefs more or less dependent on one paramount, a white man arrived with a party of thirteen blacks, who spoke Suaheli. All had firearms, and six carried double-barrelled guns. The white man was of moderate height, not stout, dressed in white, and wore a cloth wrapped round the head. He gave the chief a looking-glass, and was offered ivory, which he declined, stating that he was not a trader. He then went northwards. I do not know that this man can tell much more; he is a simple carrier who formed part of a caravan; but if we can find the head men of the party it will be possible no doubt then to identify this stranger, who seems to our hopeful imagination so like our long lost friend; and then, only think of the revelations he will have to make to us!

"It is decided that we go to Bagamoyo in two days, to make inquiry, but we must do so quietly.

"The story of a white man having been seen at Uruwa, to the west of the Lake, is a distinct thing from the more definite narrative we now have. But the one adds confirmation to the other, and shows us that if it be Livingstone on whose track we now are, that he has more than half finished his work, and is about to go to the Albert Nyanza. I may mention that there is now no doubt that the white man of whom I wrote formerly, long ago, as having been seen on one of the Lakes by an Arab who remained on the coast, was a Turk, one of the traders from Gondokoro, who have been met with in Uganda by Zanzibar merchants. The description fully satisfied me of this, and nothing is more probable. Thus the traders of Egypt and Zanzibar have now met in the interior of Africa. Speke's route has been quickly followed: how far this has been for the immediate benefit of Africa others may judge. In the end Africa will be overrun with traders in all directions, and then the vast resources of this continent will be shown.

"POSTSCRIPT.—Since writing the above, I have again seen my informant, and placed before him my books of photographic portraits. In the first book he did not recognise the likeness of the man he saw in the interior, although it contained a very fine side-view of Livingstone. In the second he at once pointed to a staring likeness of Livingstone, which I kept as a caricature, and said, 'That is the man.' 'But,' he added, 'come to Bagamoyo and see my master and the other men; they have seen him also and will tell you all they know.'

"Suspend your opinion for a little; Mr. Churchill and I go in two days to Bagamoyo to make inquiry. Please communicate this news to Mr. Webb and Miss Livingstone, and other friends; but, until my next, maintain some caution.

"JOHN KIRK."

The following despatch from H.M. Consul was next read:—

"My Lord, "Zanzibar, Sept. 28th, 1867.

"A native boat being on the point of leaving this for Makalla, near Aden, I hasten to transmit to your Lordship the copy of a despatch of this day's date, that I have addressed to the Chief Secretary to the Government of Bombay, acquainting him with the intelligence gathered within the last two days from people who have come from the interior of Africa, with reference to a white man having been seen seven months ago at a place called Marungu, 650 miles due east of Zanzibar.

"Since writing the accompanying despatch, the slave on whose information more particularly the belief of Dr. Livingstone being alive may be based, has, among a hundred photographs, recognised in the portrait of Dr. Livingstone, the man he saw at Marungu.

"This is indeed glorious news, and Dr. Kirk and I leave this for Bagamoyo, as soon as possible, to gather further information from the other members of the caravan to which the slave in question is attached.

"I have, &c.,
"H. A. Churchill."

"The Lord Stanley."

Statement made in the Suaheli language before Dr. Kirk, H.M. Vice-Consul, by a native lately returned from the interior of Africa.

"Zanzibar, Sept. 28th, 1867.

"The caravan to which this native belonged left Bagamoyo and followed the usual trade-route by Magara, Urori, and Wemba to Marungu. While they remained in one of the villages of Marungu a white man came from the south, having with him a party of thirteen natives, who spoke Ki-Suaheli. He was of moderate height, and not stout, and was dressed in white, and wore a piece of cloth folded round his head. His party were all armed, six with double-barrelled guns; the remainder with flint muskets.

"This white man gave the chief a looking-glass, and on being offered ivory in return, declined it, saying that he was not a trader, but was passing on to the next chief, but that he would accept any small thing as a token of friendship. To a Balooch of the trading party he gave a pistol, but whether this man is now in Zanzibar is now uncertain.

"It is now seven months since this white man was seen in the country of Marungu. Our informant gives the following particulars of his return route:—'Marungu is a level country. There are two rivers in it; one, the Chambezi, is full of hippopotamus; the other is smaller. In both the water flows gently to the north.

"'The head chief of Marungu is named Kitumbua; there are four others, viz., Chuga, Kasouzo, Charika, and Chanza. From Marungu to Wemba is seven days' march. The chief of Wemba is named Chubañanga; there are under him Mtuka, Mwouva, Marurani, and Kombe. From Wemba to Mambwe is two days. To Umyamwanga seven days, to Wiwa two days. Nika is close to Wiwa. From Nika to Uraga three days, to Mafua three days, to Urori one day. From Urori to Uhehe is one month. To Usagara three days.'

"This statement was made only two hours before the departure of the mails. The Banian who brought our present informant, also states that at Bagamoyo there is a rumour that a white man has been seen alone in the country of Uruwa to the west of the sea of Ujiji. It will be necessary to go to Bagamoyo for the purpose of obtaining further information.

"John Kirk."

The President then called attention to a communication from the Rev.

Mr. Price, Chief of the Church Missionary Society at Bombay, from whose establishment Dr. Livingstone took the educated negroes who were now with him. Mr. Price, like himself, disbelieved the story of the Johanna men, not only on account of their mendacious character, but for other reasons. For his own part, the President accounted for their desertion of Livingstone in this wise. They were men of the coast, and had a rooted dislike to go far into the interior of Africa, with the language and people of which they were unacquainted. Now, when these men reached the last station from which there was a chance of retreat to the coast, they resolved to abscond; and trumped up this story of Livingstone's death to account for their return, and make good their claim to the wages due to them. The question, however, would speedily be set at rest by the Expedition which had been sent out by the Government under Mr. Young. If the story told by Moosa should turn out to be true, they would have to mourn the death of Livingstone; and in that case these Johanna men would be entitled to the wages they claimed; but, should their story turn out to be as false as he (the President) believed it to be, then instead of payment they ought to receive punishment—an opinion he had already expressed to H.M. Secretary for Foreign Affairs. Mr. Price wrote as follows:—

"There is, moreover, one circumstance to which no reference seems to have been made, but which, nevertheless, strongly induces me to disbelieve the reports which have come to hand, and to cherish the hope that Livingstone is still alive, and pursuing his useful career of discovery in the heart of Africa. It will be remembered that the Doctor took with him nine African Christian lads, who had been brought up at our institution at Sharanpūr. These were, without exception, intelligent youths, about twenty years of age, and had a tolerable knowledge of English. Most of them possessed strong physical development, and, being fired with a desire for enterprise, cheerfully volunteered to accompany Dr. Livingstone. I call to mind how, when the Doctor had them together in my verandah, after giving them some account of the kind of life they had to expect and the difficulties that lay before them, he concluded his remarks by saying, very impressively, 'Now, my lads, you see we may have to encounter hardships and dangers; but bear in mind, above all things, that whatever happens, you must stick close to me.'"

It appeared that these youthful Africans had stuck close to Livingstone, and the result was that, with the addition of two or three men, as he went forward, to act as carriers, he had thirteen men with him when he was seen by the native informant of Dr. Kirk, and they all carried the muskets which we knew the expedition had been supplied with. He hoped the day would not be far distant when Livingstone, issuing by Lake Albert Nyanza and the Nile, would appear among them again; and it was the wish of his heart that he might live to preside at his reception and to congratulate him on an enterprise which was not only interesting to them as geographers, but which touched the heart of the whole British nation.

Captain Sherard Osborn said as one of those who supported the President in his original opinion, as to the amount of belief to be attached to the story of the Johanna men, he cordially agreed with him in believing it would probably turn out that Livingstone did not perish at the head of Lake Nyassa. He would go further and say, that if Mr. Young should reach the same point and bring back the same story, he would not believe that Livingstone was lost. He attached little value to Dr. Kirk's intelligence. The value of Johanna news was about equal to that picked up in the bazaar at Zanzibar—Dr. Kirk killed Livingstone one mail, and brought him to life the next. It was the natural habit of the Asiatic or the African, when a man passed beyond the little district in which he lived, to suppose that he was lost. He could state, from his own experience as a traveller and geographer, that as soon as a traveller had passed over the boundary which separated the known from the unknown, there usually arose some rumour that he was lost. This fact had come very vividly to his mind in connection with the men whom they thought, nine years ago, were lost in the Franklin expedition. After years of struggle and search for them, and after they were given up as certainly dead, he feared from evidence that has since reached us that some of them were living long after they were despaired of. Nothing, therefore, would cause him to act on the assumption that Livingstone was dead until we had indubitable proof of the fact. To turn to a more practical point, he would ask the Society to take it into their deep consideration, now that Livingstone was known to be pushing to the northward, whether the time had not come that somebody was sent from the northward to meet him—Sir Samuel Baker, if he could be obtained, if not, another good and enterprising explorer.

Mr. D. J. **Kennelly** said he could confirm the testimony of the Rev. Mr. Price, respecting the young Africans Livingstone took with him from Bombay. They were educated at the Sharanpūr Mission, an industrial institution of the Church Missionary Society. They were very intelligent boys, and from their education and the ideas they had received in India through mixing in Society, he believed they would be very helpful to Livingstone.

Mr. **Horace Waller** (formerly lay member of the Zambesi Mission) said he thought they might find in Dr. Kirk's letter reasonable ground for the hope that Livingstone was still alive. There were one or two things that almost identified Livingstone with this white man who had been seen. No double-barrelled guns would be seen in the hands of any other set of men in the interior, not even if this had been a trading party coming up from the Portuguese settlement in the south. He believed that to be one of the strongest proofs of identity. As to his dress, he was rather at a loss, unless the Doctor had by some chance lost that consular or navy cap with which they were all so familiar. It was always a surprise to his friends, when on the Zambesi that he would never shield his head from the sun. Another strong point in the evidence was the rejection of ivory by the traveller. In that country a mere traveller was not understood at all; it at once excited suspicion among the chiefs. He regretted to say that not once in a century did a white man pass into that distant country who was not a slave dealer or an ivory trader. The fact of the white man who was seen being not a trader was a strong circumstance in favour of its being Livingstone. With regard to the boys who were with him, two of them the Doctor had liberated from a Portuguese slave gang on the Shiré. They were his special favourites, and he took them to Bombay and had them educated there. These lads knew the object of the expedition, and they promised that they would return with Dr. Livingstone, come what might. He must confess that when Moosa brought the story of one of these boys, Wakotani by name, having deserted the Doctor, it at once smacked to him of falsehood. He had before told them his opinion of Moosa and his companions. A greater set of scoundrels never existed; they could not tell the truth even by accident.

Mr. **Crawfurd** said he should have been very glad to believe that Dr. Livingstone was still living, but he could not bring himself to that belief. He could not discover in the evidence produced anything to warrant the statement that Livingstone lived. What did it amount to? Simply to this, that a native belonging to a caravan had seen in the interior a white man of middle stature. That white man might have been any other European, or even a Turk. If that white man had been Dr. Livingstone, would he not, knowing that the caravan was proceeding to the coast, have sent some evidence by the party to inform his friends of his whereabouts? He had a word to say in favour of Moosa. Dr. Livingstone had great friendship for Moosa; he twice selected him because he specially trusted him. And this was the man who was supposed to have abandoned Livingstone. For his own part he was disposed to believe in the story that Moosa told.

Mr. LAYARD, M.P., asked if the young negroes mentioned spoke the language of the country to which Livingstone was going?

Mr. KENNELLY said some of them were from the Somāli country, where Suaheli was spoken.

Mr. WALLER said the two boys belonged to the Wahiao tribe, which extended over a very wide region in that part of the country. They spoke the language perfectly, and it was for that reason that Dr. Livingstone wished to take them. The Suaheli language would be spoken by the Somāli lads who came from Bombay, so that the Doctor would have the advantage of the Suaheli language as well as the Wahiao. With regard to Mr. Crawfurd's remark about Livingstone not sending letters to the coast, it must be remembered that the party to which Dr. Kirk's informant belonged was a slave caravan, and it was very likely Dr. Livingstone saw it would be useless sending letters down from the interior by such means, for these traders were too much afraid that their doings would be known on the coast, and could not be relied upon for the safe conveyance of the Doctor's letters.

Mr. LAYARD asked Mr. Waller if, in the event of Dr. Livingstone being killed, he thought these young men would have returned to the coast.

Mr. WALLER. Their first object undoubtedly would be to return to the coast and report themselves to the English at Zanzibar, amongst whom were some they had known on the Zambesi.

The PRESIDENT, referring to a remark by Captain Sherard Osborn, explained that he did not intend to convey the impression that Livingstone would be considered as lost should it turn out that the expedition sent to the head of Lake Nyassa failed to discover any traces of him. All that he said was that the expedition under Mr. Young would set at rest the question whether he was killed at the spot reported by Moosa or not. With respect to his old and valued friend, whom they called their "Objector General," he was astonished that Mr. Crawfurd stood forward to say he really believed in such a man as Moosa. Upon this point he would read a paragraph from a letter by Sir Thomas Maclear, astronomer at the Cape:—"Moosa's statements are valueless. Mr. Young intended if possible to get hold of the fellow and to take him *vi et armis* to the locality of the tragedy that he reported; but I suspect Moosa would not afford an opportunity to be caught." With regard to the suggestion of Captain Sherard Osborn, that an expedition should go from the north to meet Livingstone, he would state that he had received a letter from Sir Samuel Baker, who was formerly an unbeliever in the safety of Livingstone, and who argued strongly in favour of that view at the meeting of the British Association at Dundee, but who was now of a different opinion. He said in his letter that he wished the Viceroy of Egypt could be induced to fit out an expeditionary steamer to the Upper Nile and Lake Albert Nyanza. If this were done, he (Sir Samuel) would be glad to offer his services to lead it and meet Livingstone in his way northward from Lake Tanganyika.

The following Paper was then read by the author:—

1. *Explorations in Central America, accompanied by Survey and Levels from Lake Nicaragua to the Atlantic Ocean.* By JOHN COLLINSON, ESQ., C.E., F.R.G.S.

THE Panama Railroad, admirable as it is, does not nearly fill the requirements of the immense traffic across the Isthmus of America, nor, on account of the deadly nature of its climate and the inefficiency of its terminal Ports, does it offer inducements to passengers to avail themselves of its otherwise great facilities.

Feeling this further requirement, Capt. Bedford Pim, who had previously distinguished himself in the discovery of the 'North-West Passage' route, carefully examined the harbours and contour of the interlying country, and came to the conclusion that the best opportunity for establishing the much needed communication was by taking advantage of a Bay (since called Pim's Bay), about 35 miles north of Greytown on the Caribbean Sea, crossing the intervening tract of country between it and Lake Nicaragua by rail, steaming across the Lake and connecting with the Pacific Ocean either at Realejo or at San Juan del Sur, both excellent harbours.

He then took the first step to prove the advisability of this route by surveying Pim's Bay. Realejo and San Juan del Sur were too well and favourably known to require further examination, the country between Lake Nicaragua and these two ports had been surveyed and repeatedly examined for canal and railway schemes, and the latter reported as not only practicable but facile of construction; that which remained to be examined was the country between Pim's Bay (the Atlantic Terminus), and Lake Nicaragua,—the most formidable work however of all to the investigator, from the fact of its being a terra incognita, uninhabited and covered with a dense primeval forest and jungle, stretching from lake to ocean over at least 85 miles in a direct line.

In 1863 the first attempt was made to explore this tract; Captain Pim went out to Nicaragua accompanied by two civil engineers, Mr. Salmon and myself. On arriving there the work was portioned out to us in the following manner: Mr. Salmon was entrusted with the part lying between the utmost navigable point on the Rama River and Lake Nicaragua, while to me was allotted the remaining section lying between that point and Pim's Bay. Full accounts of the two expeditions were given at the Newcastle Meeting of the British Association, 1863. Suffice it to say, that after considerable hardships I succeeded in penetrating across to Pim's Bay; and Mr. Salmon, after bravely struggling against want of provisions, desertion, and the tropical downpour of the rainy season, was at last obliged to retreat, baffled and barely escaping with his life, from his endeavour to reach the Lake.

In 1865 another attempt was made to cut across, this time under Colonel Cauty, who, though a hardy backwoodsman accustomed to living for months in the forests, had to succumb, his men finally threatening to carry him back forcibly unless he would consent to lead them back to safety and plenty.

Such was the state of affairs when I arrived in New York with Captain Pim in January of this year; and, at the instance of certain American capitalists, I undertook to cut a clear track through from lake to ocean,—for which purpose I arrived at Greytown on February the 11th.

The hurriedness with which all this had to be arranged left me scarcely any time for preparations; just enough to purchase a few necessary instruments in New York, and none to engage assistants; but luckily on my voyage to Greytown I met, on board, Mr. Deering, an engineer on his way to California, and engaged him to assist me. He became my right hand man, and by his pluck and determination contributed greatly to the success of the expedition.

On arriving at Greytown I found to my regret that an alarm of cholera, from which the natives flee like the Hindoos in the East, had driven them nearly all away, and do my best I could only engage 5 Caribs and one Creole (as cook) to accompany me.

We started up the river San Juan on the 16th of February. But, before leaving Greytown, a word about its harbour and river. Conclusive natural evidence proves that centuries ago the sea covered the entire space now occupied by the mouths and swampy deltas of the San Juan, while among the historical accounts of the country are distinct records of the time, in old Spain's palmy days, when her ships of war regularly sailed up the river and across the Lake to Granada.

Now, a shallow canoe, steered and paddled by dexterous Caribs, can hardly clear, on the crest of the wave, without touching the bar; and light river-steamers with stern-wheels, and drawing when laden only 10 inches of water, can scarcely grope their way from rapid to rapid, whose rocky bottoms strewn with boulders, and whose rapidly flowing current, effectually bar their further passage.

Every year it becomes more evident to all living on its banks or using its stream, that the flow of water is becoming less in the San Juan; and even the least observant native, dwelling on the Lake, will tell how its banks are rising year by year visibly before his eyes, how the River Panaloya connecting the two great lakes is becoming drier every season, so much so that at times lately no water-connection has existed between them. Noting the fact that these lakes are in the middle of the great volcanic range bisecting the Isthmus, which dies out to nothing before reaching the low alluvial shores of the Atlantic, may it not be conjectured that the gradual upheaval of the centre, while the coast has remained almost unmoved, should year by year increase the gradients of the river, and by creating a more rapid flow of water cause the perceptible drainage of the Lakes and lower the level of their waters? Also, will not this help to account for the formation of the deltas and silting up of the estuary of the San Juan?

Formerly the river must have flowed out calmly almost on a level from lake to ocean, whilst now the turbid waters, hurrying down with ever-increased velocity, carry with them the débris disturbed by the floods of the rainy season, till suddenly they find a level bed; and the resistance of the denser sea-water, with the frequent violent "Northers" of those latitudes blowing full upon them, they are arrested in their course, and deposit the suspended material.

To return—after a laborious ascent of the river, I was landed at the village of San Miguelito with my small party. Commencing work on Monday, February 25th, through the stunted undergrowth that clothes the shores of the lake, and which swarms with gallipatos, those terrible pests of the Tropics, we proceeded with great rapidity; and, on March 1st, had so far advanced, that it was advisable to pitch our first camp. That night we swung our hammocks for the first time in the open air, and in spite of mosquitos slept well.

On Tuesday, the 5th, we entered the forest, which extended from there without break, eastward, to the ocean. Up to that time we had been traversing the savannahs which skirt round the borders of the lake, and lie inland in places for many miles. These savannahs are immense plains, sometimes slightly undulating with hillocks clothed with trees standing up, at intervals, like islands in the long grass which will often overtop the heads of the horsemen. In crossing these savannahs, and for some time after entering the forest, we suffered dreadfully from want of water, and were only too grateful to obtain any dregs that might be left in the pools frequented by the Dantes or Tapirs (*Elasmotherium bairdi* or *Tapirus bairdi*), and used by them alike for drinking and bathing.

We could trace the commencement of Cauty's old piquete, on entering the forest; but, as I soon found it inclining too much to the southward, I decided to quit it and strike out an independent line.

Friday, the 8th, one of my men, who had been despatched on Wednesday to San Miguelito for provisions, arrived with a welcome supply; but what we needed most was water, and had it not been for a large vine ("Bejuca"), which seems planted by Providence in dry regions, where alone it flourishes, and which yields on being cut a moderate supply of wholesome clear water, our sufferings would have been unbearable.

The forest now began to take a more distinct character, as intermixed with the everlasting palms, india-rubber trees, sapodillas, cedars, and, further on, mahoganies occurred in magnificent groves, sprawling their enormous roots over acres of ground, and rearing their vast height from the jungle beneath almost, as it seemed, up to the clouds.

Tuesday, the 12th, I shot four guans (*Penelope*), the smallest species of turkey inhabiting the American forests. The country now became more broken up, our course crossing several spurs of a high range, running to the north of us, west and east.

Mr. Deering began to feel the effects of drinking the filthy water we had been obliged to put up with. On Saturday, the 15th, however, greatly to our joy we came on a watercourse with several large and clear pools.

Monday, the 18th, we crossed the first running stream since leaving San Miguelito, and on the following day three Caribs, whom I had requested Captain Pim to send me from Leon, arrived; one of whom, Perry by name, an elderly man, I installed as "Boss" of the party.

Our total distance up to leaving off work on Saturday afternoon, was 17½ miles, in 24 working days; not so bad, taking into consideration the small number of hands. But now, having had a fair opportunity of comparing the work of these Caribs with that of the Mosquito and Woolwa Indians, employed on my first expedition, I must say that the latter were by far the best workmen. There were two very serious drawbacks to the Caribs: firstly, they were excessively particular about their food and personal comforts; if they had not for every meal plenty of meat, dampers, and vegetables well cooked, there was always great grumbling and an attempt to shirk work; they also insisted on having blankets and mosquito bars for the night, which increased the bulk of our loads very seriously; and, secondly, they always have some man among them, generally the biggest and laziest, whose dictum is invariably followed in the blindest and most obstinate manner—reasoning is wasted on them. The Indians, on the contrary, though they certainly complain if not kept well filled, are content with anything as long as they have sufficient of it to create a sense of repletion. When provisions were not plentiful, they would often sit up all night boiling and eating eboe-nuts (*Dipterix oleifera*), which quite satisfied them if they could obtain enough. As for wardrobe it was all carried in the shape of a small cloth round the loins. Their respect for a white man is very great, and the virtue of obedience is rarely questioned by them.

The country which we had passed through, nowhere in our course attaining a greater height than 400 feet above the level of the lake, had for the last few miles been broken up a good deal by isolated hills; but, on Thursday the 28th, we crossed a considerable plain stretching as far as the eye could reach to our north, and bounded on our south at a distance of 5 or 6 miles by the spur of a range running north-east and south-west, which we crossed on Saturday, at a height of 716·94 feet above the lake, and at a distance of 21 miles 528 yards from San Miguelito.

On that same day in the evening, on coming into camp, I was gladdened by finding that Lieutenant Oliver, R.A., had arrived with four men, a mule, and two bullocks laden with provisions. Mr. Oliver, at my request, volunteered to remain with us and give his valuable assistance to the expedition. As an instance of the difficulty in travelling through this country I may state that Mr. Oliver started with six bullocks, lightly laden: only two of which arrived, the rest dying on the way.

In the morning one of my men shot a wari (*Dicotyles tajacu*), the first large animal which had fallen a prey to us; we had shot a few turkeys before, but it was remarkable how much less game there was in the country than formerly. No animals seemed to be plentiful now, except jaguars. The natives accounted for the phenomenon in this wise:—Two years ago a terrific hurricane, similar to the one which has recently devastated St. Thomas and Tortola, swept over the country, utterly destroying Blewfields, and laying low vast tracts of the forests. The wild animals and birds were destroyed by myriads, and sought refuge in the very roads and houses of the little clearings on the coast of the ocean and the lake, where they were killed by the inhabitants. Since then hunting has become a profitless employment; but the jaguars, too hardy and cunning to be destroyed by the same means as the other game, have grown bolder and more ferocious, attacking men wherever they meet them, and even taking the town of Blewfields by storm. I was assured by most credible witnesses, that while we were in the cutting seventeen jaguars marched into that place one morning, and frightened the inhabitants so much by their numbers and appearance, that they shut themselves up in their houses while the jaguars killed every goat in the place—the only animals kept on the Mosquito coast.

Tuesday, April 2nd, 24 miles from San Miguelito, we struck a large stream running to the south-west. Accompanied by Mr. Oliver, I explored it for about a mile both ways. Along its banks we found in many places "machete" cuts, and I concluded that it had been visited by rubber-men, as no one else would have cared to penetrate to such a place. I set it down as a tributary of the Tule, the only river between San Miguelito and the San Juan, visited by rubber-men. Height above lake at crossing, 202·02 feet.

A large river was met on Friday, running to the south-west, and crossed 26¼ miles from San Miguelito at a level of 286·68 feet above the lake. This, I feel confident, is the main Tule River, and the one we crossed on the 2nd, a tributary from the north. As I felt pretty confident, from former observations, that the course of the Rama River is nearly east and west, and that it is of considerable length, I now looked forward to attaining the summit-level dividing the watersheds of the Atlantic and lake.

We came across the Soupar palm (*Guilielma speciosa*) on Saturday the 6th, for the first time; this palm is universally grown by the Indians round their houses, and its fruit, tasting much like a yam, is boiled and eaten when ripe. The tree is about 60 feet in height, with a straight stem covered by regular bands of long black prickles, used by the natives as needles; the appearance of the leaves on the top is similar to the cabbage-palm.

After ascending gradually for the next few days, we, to my delight, espied for the first time a grove of four eboe-trees (*Dipterix oleifera*): I took this as a certain sign of our proximity to the summit-level, as none of those trees grow on the lake and Pacific slopes of the isthmus. At the same time the vegetation, as if by magic, changed; on the lake slope the woods are principally hard and small-leaved. Mahoganies (*Swietonia mahogani*), cedars (*Cedrela odorata*), lance-wood (*Duguetia quitarensis*), lignum vitæ (*Guiacum officinale*), and india-rubber (*Castilloa elastica*) are distinguishing features; the jungle is exceedingly tough, in many places miles of prickly pear (*Bromelia karatos*), bamboo, with "bejucas," and vines, which tried the sharpest "machete" and strongest arm to cut, while the surface of the ground, except in the bottoms of the valleys, was arid, stony, and so heated that our feet were burnt and blistered by it; watercourses were comparatively few, and many of them dry. Such a country was quite unfamiliar to my previous experiences, but now every day the changing vegetation and aspect of the country reminded me more and more of the Mosquito coast. The vines became green and tender, the great coroso and cabbage-palms were now mixed with the swallow-tail (*Geonoma*), so useful for thatching, and the ribbon-like leaves of the *Circuligo latifolia*, while the prickly and club-rooted zanona (*Socratea*) would mingle their foliage with the locust-trees (*Hymenæa courbaril*), the entada with their mahogany seeds; and the swelling trumpet-trees (*Cecropia peltata*), sarsaparilla (*Smilax medica*), and the clinging vanilla began to appear, and the invaluable silk-grass (*Bromelia*) took the place of the prickly pear. Lovely tree-ferns gave their incomparably delicate appearance to grace the vegetation; running streams occurred more frequently, and the ground bceame springy and cool under our feet, while it acquired that rich black colour so suggestive of fertility.

Thursday, the 11th, the day we first descried the eboe-trees, I had to try the skill of my men as bridge-constructors. In the bottom of a level valley, a small stream wended its way through peat, which it saturated, and thus rendered most treacherous for our animals. Selecting the narrowest crossing, some 30 feet, in less than half an hour we threw over it a substantial bridge; but alas! for the impotence of the human will against a mule's; though our now solitary steady-going ox crossed with perfect safety, neither force nor persuasion could induce those obstinate brutes to trust themselves to it, and finally they all made a frantic rush into the bog, where, sinking up to their middles, they philosophically stood stuck fast. Their loads had now to be taken off and carried across by the men, and the stubborn beasts pulled out by main force by their ears, legs, and tails,—all the time resisting as hard as they could; and sometimes, just as they were being landed on the bank, succeeded in breaking loose and rolling over and over till, at last, they were sticking again in pretty nearly the same place they had been rescued from.

During the night we had a serenade of jaguars, or, as the natives call them, tigers; and, in the morning, their tracks were visible all round the camp.

As we ascended the great dividing ridge, our compasses, which had often before shown, near any ranges of hills, singular variations from true north, became more and more affected and unreliable, so much so that they were utterly useless. The iron in the basaltic rocks would have, perhaps, explained this, but that the variation until we passed the summit was always much to the east, while the great ridge stretching down from the northern part of the Chontales district of Nicaragua, in the direction of the San Juan River, and becoming less and less as it went southward, would have naturally attracted the needle closer to true north. More extended examination of the tract north and south of our line will, doubtless, reveal the cause of this curious phenomenon; but, while unaccountable in itself, it explained to me one of the causes of Cauty's ill-success, as he, unacquainted with the use of the theodolite, trusted to his compass-bearings, which took him a long way south of his true course into the heart of the great valley of the Indian River. Other curious causes of variation were some of the enormous mahogany and wild cotton-trees (*Ceiba bombax*), which would often attract the compass as much as 3°.

On Saturday, April the 13th, we at last attained our summit-level, 619·86 feet above Lake Nicaragua, and 747·86 feet above the Atlantic Ocean level, at a distance of 31 miles 1448 yards from the former, and 69 miles 1145 yards from the latter.

Our provisions were now getting very low, and we were obliged to make our meals off rice mixed with—whenever obtainable—a delicious wild honey collected by a very small species of bee, not larger than an English house-fly.

Tuesday, the 16th, spite of promises of rewards and increased pay, the six Caribs and one Spaniard deserted us, stating as their reason that they could not longer live on frijolas, which gave them in their expressive language "belly-swell." Our party was now reduced to ten in all; however, not the slightest hesitation was shown, but a firm resolve prevailed to reach the Atlantic in spite of all obstacles.

Next day a Spaniard, who had been surveying for me at Realejo, arrived at our camp accompanied by an American and a native, informing me that Captain Pim was coming to pay us a visit the next day. Early on the following morning he arrived at our camp, which was named after him "Bedford Camp." Shortly after his arrival we went on ahead to the cutting party, which had been despatched to work early in the morning; and, to complete the pleasure of the visit, we found that the party had just struck a large river running in our course to the east, over large basaltic boulders and in deep and wide pools. This was by far the most considerable river we had yet met, and turned out to be, as we assumed at the time, a tributary of the north branch of the Rama River. I named it "Susannah River," after Mrs. Pim; its distance from San Miguelito was 34 miles 870 yards, and the water 398·62 feet above the Atlantic.

Next day, Good Friday,—a day religiously kept by the Spaniards—was declared a holiday. Captain Pim left us in the morning, expressing an intention of accompanying a party, who, according to instructions I had left at Greytown, were to start on the 25th inst., with provisions to meet us at Rama station. The following morning we left Bedford Camp, which was $33\frac{3}{4}$ miles from San Miguelito, and after crossing the river three times, struck it again at some beautiful falls, which were named after Mrs. Collinson, "Cecilia Falls." The river above them lay in a deep, wide pool, and suddenly meeting a breastwork of basaltic rock, was confined in a narrow channel, over which one could jump during the dry season, fell into a deep hole in the rock about 15 feet below, and then rushed down boiling and bubbling over a layer of rock strewn with boulders. The rock presented a very curious appearance, from the fact of its being covered all over with circular holes, from 6 inches to 3 feet deep, created by the action of shingle worked round and round by the falling water. Here we observed a very curious small lizard (*Anolis sp.*), which has a yellow pouch under his breast which he expands on being frightened, and often intimidates his foes by the action. He frequents the banks of rivers, and is very fond of basking on dry stones in the water.

The work of moving was now getting day by day more laborious, on account of the soft bottoms of the innumerable small streams we had to cross, and in which the mules invariably stuck fast.

Our course again crossed the Susannah River, which had been winding round some hills to the north, on Saturday, the 27th, at a distance of 39½ miles from San Miguelito, and at a level of 251·27 feet above the Atlantic.

Before reaching it we came on a very curious cave, hollowed out of the side of a high hill: the orifice was about 2 feet in diameter, swelling out in the interior as far as we could see to about 6 feet each way. A few days afterwards we discovered two similar ones. The natives declare them to be made and inhabited by a large owl.

The weather up to this time had been unusually fine, not more than three wet days since quitting San Miguelito, but at night a shower was a frequent occurrence; the temperature was often very chilly, about 2 o'clock in the morning, after crossing the dividing ridge, but before doing so the nights were nearly as sultry as the days.

Our animals were now reduced to four by the loss of another mule, two of which were hardly of any use, showing unmistakable signs of giving in. On Tuesday, 30th, the last horse died, and the next day our bull was nowhere to be found. The supply of grass for the animals in these dense forests was very limited, and we were obliged to let them roam at their will during the night, so as to forage for themselves. The most diligent search could not discover the bull, and we were, to our sorrow, compelled to conclude him devoured by jaguars, or lost beyond chance of recovery.

On Wednesday, May 1st, we found the Susannah River running parallel and quite close to us, and suddenly on nearing it on our right we came full into a much larger river, running to the south, crossing our course at right angles, and then turning sharp round to the east, in which for the first time since quitting the lake numerous alligators appeared swimming about. The joy at this discovery was beyond measure: our provisions, with the exception of a few frijolas, expended, our carrying facilities reduced to two poor mules, barely able to totter along, the men had fancied that the Susannah was no tributary of the Rama, and that following it as we did, day by day, with no perceptible increase in its volume, we might go on until death by starvation should kill us one by one. This melancholy picture seemed ever before their eyes; but when we suddenly, without notice or warning, came on the junction of our river with one three times its magnitude, running majestically between banks of long "scutch"-grass, with the broadleafed *Heliconia bicolor* flourishing in the first open sunlight met during the wearied time we had toiled from San Miguelito, the very sight of the sun and cloudless sky, after the darkness and ghostly forests, seemed to give fresh light and vitality, while the appearance of the river-banks,—so suggestive of the San Juan and other well known streams—gave to their imaginative minds omens of a speedy arrival at the habitations of men.

This fine stream was undoubtedly the north branch of the Rama, and was crossed by us 41½ miles from San Miguelito, at a height of 229·64 feet above the Atlantic, and could not be very far from its junction with the south branch, the furthest point to which our former explorations of the river in 1863 had extended. A camp was immediately pitched here, as the "scutch"-grass on the banks offered such a capital opportunity for the mules to recruit. In the afternoon Mr. Oliver had a very narrow escape from a puma (*Felis concolor*) which sprang at him when jumping across a stream, from behind a tree overhead. Though his gun was only loaded with B.B. shot, fortunately the two charges settled the brute, some of the shot penetrating his brain; his skin was soon peeled off, and preserved as a trophy.

We now were obliged to come to the conclusion that the two remaining animals could not possibly carry baggage for all; and I made up my mind to have a raft built, so that, while keeping the survey as close as convenient to the river, the things might be floated down from camp to camp. Such being my decision, I started off with the two mules, a tent, and a few necessaries, with the cutting party on the 3rd, with the intention of working until we again hit the river, when I would despatch a messenger back to the Junction Camp, where I had left instructions to have a large raft built of "mountain-mahoe" wood. This is an invaluable tree to the natives in that land of many lagoons and rivers, from its extreme lightness, as also from its affording a species of brown cotton, very soft, and much used by the better class of Creoles for stuffing mattresses and pillows; when growing, it is extremely like, and hardly to be distingushed from, the trumpet tree.

We worked at the cutting on the 3rd until quite dark, and not having yet reached the river, were forced to camp in a bamboo-thicket with no water, so that it was necessary to send men back over half a mile with lanterns to obtain sufficient to quench our thirst. At about 9 o'clock, however, next morning, we heard a great noise of falling water to our right, and, cutting a narrow track through in the direction of the sound, we came on some beautiful falls of the Rama, not unlike, though much larger than Cecilia Falls, distant from San Miguelito 44 miles. A man was at once despatched to the party behind under Messrs. Oliver and Deering, with instructions for them to raft it down the river at once; and in the evening we were joined by the whole party.

That evening I held a council, in which our position was seriously considered. We found on examination that all the provisions we had left were frijolas enough to supply two meals for all hands, and absolutely nothing more. I therefore decided to start at daybreak on the morrow down the river on the raft with Oliver, two Spaniards, and two Caribs, to try and discover the party from Greytown with provisions, leaving Deering in command of the remainder, with orders to follow us in two days if we had not then appeared.

Our camp was pitched that night about 200 yards from the river, in a thick bamboo-brake; and during the evening we were disturbed several times by hearing wild beasts walking very close to us: however, about 10 o'clock, well worn out with the fatigues of the day, Oliver and I fell asleep, though not so Deering. As usual, our hammocks were slung in parallel lines under the tent, mine in the centre. Deering, the only one awake, fancied he heard footsteps unpleasantly close to our camp, was just on the point of awaking me, when a branch cracked, as if an animal had trod on it; some heavy body jumped over him, just striking his hammock's edge; the same moment I was struck a tremendous blow on the hip, capsized out of the hammock, and found myself rolling on the ground, trying to extricate myself from my blanket, with every body awake, and holloaing out "Tiger!" The noise frightened the brute off; he had evidently made a miscalculation, luckily for me, and instead of alighting on top of me with his claws, jumped a little low, and struck me with his head. We heard the brute and some companions softly walking round us all night, and were uncommonly glad when daylight appeared.

Leaving all our provisions, except enough for one scanty meal, with Mr. Deering, we commended ourselves to Providence, and started on our hazardous voyage on Sunday morning, the 5th May.

At first we glided down the river calmly enough, the men pushing our raft along with their "polancas;" but after about a couple of hours we came on rocks and rapids, over which the raft could not be passed, but had to be taken laboriously to pieces, and pulled over stick by stick. While this operation was being performed we saw a jaguar of an extraordinary size, fully as large as a Bengal tiger, cross a small tributary running into the river on the right, and make towards us. The raft was fortunately ready for embarcation again; so we deprived our friend—who I believe would have attacked the whole party—of the chance of a meal. I must here note that, like all else, our bullets had long since been expended, and it would have been foolhardiness to court a contest with such a brute against B.B. shot.

During this day no less than five rapids were passed, and so laborious was the work of taking to pieces and putting together the raft, that we travelled scarcely more than 2 miles. The river was a succession of long pools, 15 to 20 feet deep, and about 150 feet wide, with scarcely a perceptible current, connected sometimes by rapids, with gravelly bottom strewed with boulders, and at others by crevasses in the basaltic rocks, in which the water would be confined in narrow, tortuous, and grimly black passages, down which it rushed boiling and frothing to another silent pool.

At the head of one of these romantic chasms we camped the first night. The wild animals always use these contractions of the river for crossings, as they can jump from one rock to the other without entering the water. So many jaguars and tapirs, who have a peculiar penchant for trampling out fires, surrounded us during the night, that we had to keep watch turn by turn for fear of an attack, while those not on duty, having left their hammocks behind, would seek the most comfortable holes in the rocks and curl themselves up to sleep until their turn for watching arrived.

The 7th, Tuesday, dawned on us, and yet no signs of the party we were in seach of. Still rapids and pools alternately presented themselves, and so frequently came the former, that more than three quarters of the day we were up to our waists in the water, passing our "Mountain Mahoe" sticks down them. An iguana furnished breakfast for us again, and after eating it, resuming our voyage, we floated down a long beautiful stretch of the tranquil waters of the river. On a sudden, turning a sharp corner, a cheer burst from all our lips. There, less than 200 yards ahead of us, on a prominent rock jutting out into the river, was Captain Pim, accompanied by

Charles, the "Boss" of my 1863 expedition, and another Creole, who represented my provisioning party. The Atlantic and Pacific were at last united, and all our anxieties were at rest.

After the first joy of meeting had subsided, on inquiry I found that the bulk of our provisions had been left outside the bar of the Rama, in a sheltered nook, called Grindstone Bay, as the sea was running too high at the time to admit of a safe entrance for a loaded canoe.

Collecting together all the party had brought up with them, I sent some men back to Mr. Deering to inform him of our success and stay his further progress down the river.

I then continued the descent of the river, and, following the party to where their canoes had been left, we came on the grandest falls yet seen. I had often heard rumours from the natives of the "Big Falls," just above the junction of the north and south branches, and of their terrible nature, but until then had set down much to their fondness for exaggeration. But I was rapidly undeceived, and understood how easily the superstitious feelings of the Indians would be worked on by the sight that now met my eyes. The river running its placid course between low banks covered with "scutch"-grass, wild plantains, tree-ferns, and the venerable spreading Indian fig-tree, clothed with a matting of creepers (*Bauhinias*), and vines falling down over the water from their overhanging branches, like a curtain, suddenly changed; a great upheaval of volcanic rock, which had evidently, by damming the river, formed the long deep pool above, barred its progress, but opened a narrow winding passage, down which the water rushed for over half a mile, and dashing up against the caverns it had hollowed underneath, often obstructed in its course by immense masses of rock hurled by some convulsions of nature into the stream, sent for miles an ominous sound like confined thunder. The rocks bare of vegetation, and frowning up black and perpendicular from the waters, completed the weird contrast of the picture.

The following day, the 8th, we arrived at Rama Station, an old Indian village, my former starting-point. We then continued our voyage as far as the first inhabited Indian village. The chief, who had assumed the name of "Shepherd," soon recognised me and held out the right hand of fellowship. This man is about the finest Indian I ever met; a Rama, though perhaps hardly pure, as he has a slight moustache, but preserving all the other characteristics, clean shining brown skin, height fully 6 feet (though from his immense breadth and muscular power he seemed much shorter), with an intelligent expression and severe and determined countenance.

He soon stirred up his wife, who, according to their rigid laws, may not speak to any one out of the tribe, and ordered her to prepare some "mishla" for us, but, at my request, without the chewing process. This *mishla* is a drink prepared in a similar manner to the "kava" of the South Sea Islands out of cassada (*Jatropha manihot*), ripe plantains, pine-apples, and cocoa-nuts.

Captain Pim and Mr. Oliver shortly after went down the river with my men, intending to send the provisions up to me, and then proceed to Greytown for more. I spent the night with my friend Shepherd, who made me a lot of presents; among others, a fine bow and arrows, the former made from the soupar palm (*Guilielma speciosa*), the latter from the dry stalks of the sugar-cane (*Saccharum officinarum*) blossom, tipped with an exceedingly hard wood, called "ouka."

On Saturday, the 11th, I started up the river again with my provisions, which had arrived early in the morning. In the evening we reached Mr. Deering's camp, and soon settled our morrow's work.

Our great anxiety now was to reach Rama Station, and thus complete the work before the rains came on, which swell the streams so as to render them impassable and fill the undrained valleys with water. They are always expected about the end of May or first days of June, and we had only sixteen working days left in the month, with a distance of 16½ miles still to cut.

We, therefore, all put our whole energies into the work, and had proceeded so far that on Saturday, the 18th, camp was moved below the "Big Falls," but, unfortunately for us, our line did not come close to it; on leaving off in the evening we had, therefore, to follow the course of a small stream until it emptied into the river, and then wading down as far as we could, were finally obliged to stop on account of the darkness and depth of the water. Swimming would have been madness, as the water was swarming with alligators and crocodiles (*Molinia Americana*); and, had we escaped them, in all probability we should have been dashed to pieces over some of the numerous falls and rapids. Night coming on, we lay down in our wet garments on a flat rock, and most of us fell asleep; but about one in the morning a halloa awoke us, and there was Charles with a canoe and lantern, come in search of the missing wanderers.

On Friday, 24th, having given the cutting party, which was now abreast of the junction of south and north branch of the river, their direction, I explored the former in a canoe with Charles and roughly surveyed its course for a few miles. It seemed to contain about the same volume of water as the northern branch, but to be a calmer and less turbulent stream. Its course as far as I went was nearly due south, but I do not estimate its length as very considerable, for, if so, it would soon reach the watershed of the "Rio Indio." At its junction with the main stream was an old plantation, with a fair supply of plantains and bananas, and a little further south we discovered on the banks of the river part of an old "rubbing stone" used by Indians and Spaniards for preparing chocolate. Higher than this I feel assured that no Indian has ever penetrated, but that, terrified as now by the sight and sound of the "Big Falls," the numerous race which must once have peopled this river contented themselves with the tranquil waters of the lower Rama, where they could paddle their canoes in safety, and that we were the first who had penetrated through these sombre forests, from lake to ocean.

The rains were now commencing to set in, and the average of fine weather was not more than two hours a day; the warm steam arising from the hot deluged ground penetrated our instruments and tried our patience while using them to the utmost.

On Monday, the 27th, we crossed the mouth of "Charles Creek," 55½ miles from San Miguelito. This creek crossed Mr. Salmon's former line; but I am inclined to think he must have kept too much to the north, as Cauty kept too much to the south: we certainly, keeping between both, hit the right point.

We moved out camp on Thursday, the 30th, to "Duck Island," in the middle of the river, facing a grand range of hills running down from the northward to within a quarter of a mile of the river.

At 1·40 P.M. on Monday, June 3rd, we cut out at last to Rama Station, and on Wednesday Mr. Deering brought his levels to a termination, and our last and 37th benchmark was cut and engraved at a distance of 61 miles 854 yards from San Miguelito, and a height of 115·17 feet above the mean level of the Atlantic at Pim's Bay. The afternoon of that day I occupied in exploring the creek opposite Rama Station, but I soon found it contract so much as to render the progress of a canoe difficult. At its apex with the Rama River were the ruins of an old Indian village, with curious carvings of figures on the trees.

The next day we all started down the river on our homeward way, stopped at Shepherd's to pay him a farewell visit, and after killing a mountain cow and some wari we arrived at "Tincum's Village," at the mouth of the Rama, at 6 o'clock the next morning, cold and drenched through with the incessant rains.

Hastily swallowing a cup of coffee, we started off for the bar, knowing the necessity of crossing it as soon as possible, for fear of one of the gales which often occur at that season of the year arising and stopping our progress. To my intense disappointment the bar was declared impracticable, there being three distinct lines of breakers, one outside the other; two were the limit, my men said, they could cross in safety.

Tincum's village, a collection of about twenty huts, was certainly a model Indian settlement, the huts were all beautifully built of stout posts of lancewood (*Duguetia Quitarensis*), filled in with the tough "sillico" stems, and roofed with the leaves of the swamp-growing "scumfra." They were incomparably superior to the wretched Spanish hovels of San Miguelito, and showed strongly the superiority of the pure Indian over the mongrel descendents of his race and the Spanish conquerors. The hatred of the Ramas for the Spaniards was intense, and only the friendly feeling of the former towards me saved the latter from destruction. Before parting, Shepherd gave the Spaniards a hint that if they ever came to his country alone, he would have the greatest pleasure in killing them all. The statement was made in such a serious matter-of-fact way that I could not help laughing; but the poor Spaniards, gazing on the giant's proportions, evidently did not feel safe or happy until they had left him some way behind.

On Wednesday, in spite of my men's warning of the still dangerous appearance of the bar, my patience was exhausted, and I determined to try it; packing our canoes we steered steadily for it, and watching our opportunity darted over with a slight ducking, but in perfect safety. That evening we slept at "Great Grindstone Bay," as the men feared the Greytown bar at night. Sandflies innumerable bit us during our hasty sleep. At 11 P.M. we re-embarked, had plenty of rain, and arrived at Greytown over a tranquil bar at half-past 8 next morning. So ragged and wet and worn, without shoes or stockings which had long since quitted us, were we on arriving that the honest people hardly knew us; but a good sleep, wash, and decent clothes, soon put us to rights. Our health, notwithstanding all hardships, had never been better, and when we embarked in the *San Francisco* for New York, on the 22nd of June, we could safely say that having tested the climate of Nicaragua and Mosquito in its worst aspects, it had not hurt us.

The results attained by this expedition are important. The penetration across from the lake to the Atlantic, with a summit-level of only 619·86 feet above the former, does away with all the fears that previously existed of there being inaccessible and lofty mountain ranges to bar the construction of a railway. Taken as a broad fact, the only range of importance, the Cordilleras, which in other parts of the isthmus forms so impassable an obstacle to railway construction, has here by a freak of nature, with the exception of a few of its highest peaks, been obliterated and covered up by Lakes Managua and Nicaragua, down which its central line runs.

Before, however, reaching the northernmost lake, the Cordilleras shoot out two subsidiary ranges, one on each side, which enclose and form the watersheds of the two lakes. In the range running down between these lakes and the Pacific Ocean, a pass at the height of 615 feet has been discovered; while in the other range an almost similar altitude of 620 feet has been disclosed by my recent surveys.

The two secondary ranges running north and south have, in their turn, numerous spurs, between which the rains make their channels and flow off west and east, as in the case of the Tule and Rama rivers.

Another point of importance—the question of impassable swamps—has been set at rest: absolutely none exist. The only signs of marshy ground we discovered was on the margin of the lake, where in some places the low-lying parts of the savannahs are almost below the water-level; but as these parts, forming "esteros" in the wet season, lie between low hills of 50 to 100 feet in height, running east and west in the natural drainage direction of the country, they can be avoided entirely.

A great deal might be written of much interest on the geological features of the country, but time will not allow me to do more than indicate them. The parent and secondary ranges of the Cordilleras are volcanic; and though to the north of Lake Nicaragua and between that lake and the Pacific much good limestone exists, on our course between the Lake and Monkey Point, with the exception of sandstone, the rocks wherever apparent were always volcanic,—basalt, porphyry, and tufa overlying entirely the former strata.

These volcanic rocks, except on the tops of the hills, are covered with a subsoil of yellowish earth, formed by their own degradation, taking in places the consistency of clay, and in the deeper valleys forming a soft conglomerate with large masses of flint imbedded.

In its turn this subsoil is covered by rich loam formed of decayed roots and vegetable matter, which watered by the tropical showers is astonishingly fertile.

In conclusion, let me observe that this expedition—undertaken without adequate means or time, dreading the approach of the rainy season if it relaxed its eager speed for one moment—was naturally imperfect, and will necessitate more searching and leisurely surveys before the best and most economical route can be ascertained; but it has succeeded in its grand object by demonstrating not only the practicability, but also the advisability of the route for a Transit, and has laid the basis for all further examinations by having good and durable bench-marks cut along the line at short intervals, with their heights and distances from lake and ocean accurately measured and recorded.

APPENDIX.

WOOLWA VOCABULARY.

Libra.	Woolwa people.
Wahi.	Brother.
Al.	Man.
Yel.	Woman.
Sirou backar.	Girl.
Al backar.	Boy.
Backar.	Young.
Yalki.	Wife.
Alkimuk.	Husband.
Pamki.	Tapir.
Nowarpowka.	Red tiger.
Powka.	Red.
Nowar.	Tiger.
Nowar bulka.	Spotted tiger.
Nowar burruska.	Black tiger.
Bulka.	Spotted.
Burruska.	Black.
Pichca.	White.
Sunna.	Deer.
Sowie.	Wari.
Cassi.	To eat.
Caskouting.	Eating.
Deekoting.	Drinking.
Soopokoting.	Sucking.
Deeko.	To drink.
Yappoo.	Alligator.
Kahama.	Iguana.
Was.	Water.
I warra.	Come here.
Baina warra.	Come here quick.
Yowanakou.	Let us go.
Kourring.	Canoe.
Wahinah.	Paddle.
Koobil.	Knife.
Seeban.	Bow and arrows.
Keeddak.	Axe.
Oorrus.	Monkey.
Wummi.	Curassow.
Wunkuruman.	Guan.
Woomalo.	Partridge.
Moolakoos.	Peccary.
Yamka.	Good.
Dootka.	Bad.
Awai.	Yes.
Aissou.	None.
Eessou.	No.
Ahmakouting.	Sleeping.
Meouhka ahmakouting.	To sleep.
Toonik.	Head.
Tas.	Cloth to wear round the loins.
Kalki.	Foot.
Kinki.	Hand.
Wakki.	Plantains.
Inkkini.	Bananas.
Um.	Corn.
Sussunka.	Beads.
Simming.	Fish-hooks.
Sooksuwookka.	Cord.
Asnar.	Cloth.
Soobba.	Pot.
Watikah.	Banana bird.
Vecah.	Hare.
Kee.	Rock.
Sou.	Ground.
Souassung.	World.
Nowal.	Devil.
Waikou.	A god.
Mah.	Sun.
Waikoo.	Moon.
Mahbruska.	Sky.
Waslouti.	Rain.
Ewi.	To die.
Yowahkooting.	To walk.
Yoolbutiang.	To talk.
Mahdi.	To-day.
Yun.	To-morrow.
Dummi.	Yesterday.
Koo.	Fire.
Koolaka.	Firewood.
Pun.	Wood.
Quassika.	Hammock.
Keettung.	Waterfall.
Tookwunnah.	Big.
Was.	River.
Tooki.	Mouth.
Meekduka.	Eyes.
Anaki.	Teeth.
Tapahki.	Ears.
Bas.	Hair.
Ki.	Mine.

Yungdeeki.	Yours.	Waya hal.	Mosquito man.
Washbiloo.	Mishla.	Waya yel.	,, woman.
Moohiwah deekana.	His.	Souhtuk.	Calabash.
Amiseeka.	Sister.	Mahbootoring.	Fighting.
Passingka.	Father.	Koomah.	Salt.
Mamaka.	Mother.	Koomhoo.	Rabbit.
Kahaloo.	Shirt.	Backar kee.	Children.
Kahasong.	Trowsers.	Oo.	House.
Coocoo.	Cocoa-nut.	Assun.	Hill.
Almuk.	Male.		
Tooroo.	Cattle.	Aslar.	One.
Pamka.	Horse.	Bou.	Two.
Boorroo.	Donkey.	Bas.	Three.
Mulah.	Mule.	Aroonca.	Four.
Malakah.	Indian rabbit.	Seenca.	Five.
Kookmik.	Armadillo.	Deecca.	Six.
Hoombooka.	Bird.	Yecca.	Seven.
Ooli.	Turtle.	Bachca.	Eight.
Taspool.	India-rubber.	Tingnicaslar.	Nine.
Deehlatookuting.	Cooking.	Tingniskoobou.	Ten.
Pun.	Tree.		

MOSQUITO VOCABULARY.

Narra bal.	Come here.	Pies.	Eat.
Eine.	Make haste.	Ploom.	Victuals.
Kaiser.	Let us go.	Dies.	Drink.
Douce.	Stick.	Lia.	Water.
Yerri.	Long.	Lia Kowta.	Cold water.
Clucki.	Cut.	Wano.	Come along.
Brebal.	Bring it here.	Apia.	No.
Yany.	Mine.	Aou.	Yes.
Man.	Your.	Yabra.	North.
Eisiken.	Father.	Blanco.	South.
Yapti.	Mother.	N'emopera.	Go this side.
Mooine.	Eldest brother.	Passer.	Wind.
Deevra.	Youngest brother.	Keero.	Knife.
Lakreka.	Sister.	Rakboos.	Gun.
Tahte.	Uncle.		
Yapti deevra.	Aunt.	Kumi.	One.
Damer.	Grandfather.	Wal.	Two.
Kookah.	Grandmother.	Yumpa.	Three.
Pearker.	Widow.	Walwalun.	Four.
Mair.	Wife.	Matasip.	Five.
Mair waikna.	Husband.	Mata walkaby.	Six.
Mairen.	Woman.	Mata walkabykumi.	Seven.
Waikna.	Man.	Matawal wal.	Eight.
Lilla.	Mistress.	Matawal yumpa.	Nine.
Almuks.	Old man.	Matawal sip.	Ten.
Hupla.	People.	Youan eiske.	Twenty.
Mehi.	Friends.	Youan eiske wal.	Forty.

The **President** said, as Englishmen they must all be proud of Mr. Collinson, a civil engineer who had shown so much skill and perseverance in surmounting the difficulties of this original survey of a wild country, and had laid before them geographical data of considerable importance. He would first call upon Captain Bedford Pim, who was the original projector of this traverse of the isthmus, and who had previously distinguished himself by his researches in the Arctic regions.

Captain **Bedford Pim** said the able paper of Mr. Collinson left him hardly scope for saying a word upon the subject. There was one point it might be desirable to mention, which was, that Mr. Collinson's feat was absolutely the first spirit-level survey across Central America, with the exception of that undertaken for the Panama Railway. He had great pleasure in bearing testimony to the ability of Mr. Collinson. Few people were aware of the amount of hardship and difficulty met with in cutting through the dense forests of Nicaragua. Mr. Collinson surmounted every obstacle with a degree of bravery and perseverance which deserved high praise, and had it not been for his great exertions he (Capt. Pim) should have had to return to England for the third time disappointed in opening up this hitherto unknown tract of country. Lieutenant Oliver of the Royal Artillery, already well and favourably known to this Society, was also entitled to much credit for the able manner in which he assisted Mr. Collinson, in the traverse from the lake to the shores of the Atlantic.

Captain **Maury** (U.S.), after acknowledging the great services which Captain Pim had rendered to the commerce of the world by projecting and carrying out the Nicaragua route, observed that he had rendered no less a service to geographical science. He and his able assistants had made us acquainted with the geography of these regions, and given us an amount of information which we never possessed before. He (Captain Maury) was of opinion that the Nicaragua route would be preferable to the Panama one for crossing to the Pacific. All that country was liable to what are called periodical rains. A belt of cloud might be considered as extending in these latitudes from the coast of Africa across the Atlantic to the shores of America. This cloud-belt moved from north to south with the sun in declination. It went as far south as lat. 3°. When it came north it passed over Panama and Mexico, and was the source of the periodical rains in those regions. But the effect was the annual occurrence of a long period of calm in the Pacific near Panama, which rendered that part difficult of access by sailing vessels, an objection which did not apply to the ports of Nicaragua, where these calms are unknown. When he was in Mexico two years ago he had the honour of calling the attention of the Emperor Maximilian to the subject of investigating the phenomena of this cloud-belt, with its accompanying rainy season. His Majesty, with that enlightenment which was his characteristic, authorised him to procure instruments from London, with a view to the establishment of not less than 62 meteorological observatories in Mexico, which were placed under the direction of the Geographical Society of that country. He was surprised to find this Mexican Society in so flourishing a condition. For many years, notwithstanding the revolutions in that country, it had been pursuing its quiet work, publishing its journals from time to time, and holding regularly its meetings. He could not tell what had become of the instruments; but he thought it was worthy the attention of the Council of the Royal Geographical Society of London whether they would not open a correspondence with the Mexican Society, with the view of obtaining from them the observations which these instruments were sent to procure.

Admiral Sir **Edward Belcher** said, perhaps as surveyor of the whole of the Pacific coast of Central America, a word from him might not be unimportant. He questioned if any of the persons who had spoken had any personal knowledge of that coast, or of the climate, the winds, or the facility of travelling along the coast. When he was there he never had any difficulty in getting in and out of the Bay of Panamà. He was glad to hear that a route had been surveyed across Nicaragua, but he thought the proposed line started from an awkward part of the coast on the Atlantic or eastern side, where there was great difficulty in effecting a landing. It would not be easy to find anchorage for ships; neither was there any harbour on the opposite or Pacific side; and the frequent gales of wind on that coast termed Papagayos would dismast any ship that attempted to approach it from seaward under canvas. A little to the southward there was a splendid harbour, perfectly free from gales. If the party had run their line further to the south-west, through Costa Rica, they would have found a fine country. On the other hand, in the Bay of Honduras, a line had been examined by Mr. Squiers, many years ago, and found to be practicable; while the Gulf of Fonseca to the southward, where that line terminates, would contain the whole navy of England. On these accounts he would have preferred a more northerly line through Honduras,—a country infinitely richer in every way than Nicaragua, with a better climate, and perfectly free from those insect pests which were found further south. With respect to the communication between Colon and Panama, he never heard till this evening that there was any difficulty in landing at Colon; and on the Panama side, from 1837 to 1840, he was in the habit of sending the *Starling* tender under Captain Kellett backwards and forwards with despatches, with such certainty that he knew almost to a day when he would arrive. All the accounts about the difficulties of the Bay of Panama he could not comprehend, for he never experienced bad weather or a gale of wind there in his life.

Commander PEACOCK said he had surveyed the coast of Nicaragua as far back as 1831, and had the honour of discovering that the coast-line had been laid down 58 miles of longitude in error on all the maps and charts previous to that time, which was afterwards verified by Capt. Owens, R.N., in H.M. surveying ship *Blossom* in 1832, as the discovery was considered so important that the Commander-in-Chief ordered this ship to proceed to the Mosquito coast on purpose to ascertain the truth of this extraordinary error, which had remained for upwards of *three centuries* in all the maps and charts of the world. This coast was discovered by the immortal Columbus in the month of September, 1502, when on his fourth voyage. Mr. Peacock had also had the honour of surveying the Isthmus of Panama from ocean to ocean, and of commanding the first steamship that ever visited Panama, in February, 1842. He also had the honour of calling attention in 1831 to the route across Lake Nicaragua by steamers of light draft and by railway to St. Juan del Sur, and his letter on the subject would be found in the archives of the Admiralty, with this comment—"should the *west* coast of Nicaragua be laid down correctly, the eastern coast being so much in error, the distance across to the Pacific would, by this singular discovery, be 60 miles shorter than hitherto supposed by geographers." Mr. Shepherd told him that he had taken a schooner drawing 6 feet of water up the Colorado branch of the river to Lake Nicaragua; and also that the ground between the lake and St. Juan del Sur was very easy for carrying a railway across. He (Mr. Peacock) had also explored the river St. Juan to its junction with the Colorado branch, and could endorse all that Mr. Collinson had stated in the able and interesting paper they had had the pleasure of listening to, in respect of climate and the numbers of jaguars, alligators, &c., met with in the jungle and on the banks of the rivers on that coast. In the letter he had had the honour of addressing to Admiral Colpoys in November 1831, he named an excellent suggestion of Mr. Shepherd's, viz., that if the Colorado branch of the St. Juan were to be dammed across, at its confluence with the latter, falling into the harbour of St. Juan, he believed it would scour a deep water-channel from thence into the harbour, and enable vessels of some draft to ascend at once to the lake. With respect to the remark made by Mr. Collinson as to large vessels having been said to have ascended the St. Juan in the early voyages of the Spaniards, it is not improbable that the Colorado branch may be comparatively of *recent* origin, which would account for the shallow condition of the St. Juan itself at this time, for the hydrographical changes that have taken place ever since 1831, by the growing out of Point Arenas upwards of 1½ mile in length in less than 30 years, is one of the most remarkable changes, by natural causes, known; for what was a good harbour from 1831 to 1857, with anchorage for a fleet of large ships, having deep water on both sides of this natural dyke, became converted into a lagoon in 1859, by the spit joining the mainland—soon after which the harbour was shut up.[*] Capt. Freeman, of the sloop *Countess of Belmore*, employed in the shell-turtle fishery on that coast, told Capt. Peacock that rich mines of gold and silver existed a few days' journey inland from Blewfields to the northward of St. Juan, which doubtless were those now known as the Chontales mines.

Dr. SEEMANN would speak as to the feeders of the projected railway; he had twice explored the greater part of Nicaragua under the direction of Captain Pim. His route lay from Leon north-eastwards. After leaving Leon, and for four or five days' journey, the climate gradually became delightfully fine. He went up as far as the boundary of Honduras, and found there extensive mining operations going on, the ore being chiefly of silver. He then went southward to Chontales, the new gold region, which had been brought into notice by Captain Pim. The climate of the Pacific side of Nicaragua is comparatively dry, and the rainy season short. After passing to the east of the lake the rainy season becomes prolonged several months, the rains continuing till February, while in other parts they cease in November. The vegetation on the Pacific side is similar to that near Panama; but at Chontales it is much more luxuriant, and the timber there is finer than it is on the Pacific side. The whole of the Chontales forest is a virgin forest. At his suggestion a meeting had lately been held in Chontales to ascertain the possibility of cutting a route from Chontales to the Blewfields settlement. He had found that several people had made their way to the coast; and he was glad to say that a route was now being cut under the direction of Colonel Maury, and by order of the Javali Company.

Mr. J. H. MURCHISON observed that Admiral Belcher, while speaking of the Honduras route, had forgotten that no proper survey had been made across Honduras; whilst at Nicaragua a most elaborate and able survey had been carried out. More than that, a transit route had already been in operation across Nicaragua to St. Juan del Sur. Another circumstance in favour of the route proposed by Mr. Collinson was that the United States Government, about two years ago, had sent a staff of engineers to survey the Atlantic coast of Central America, under the charge of Captain West, who, after pronouncing the harbour of Grey Town impracticable, and making a special survey of the harbour at Monkey Point, had stated that this was the harbour on the Atlantic which could be made the most practicable for commercial purposes. Again, the climate was finer than at the Isthmus of Panamá, and the distance from New York and Liverpool to San Francisco, by the Nicaragua route, was considerably shorter than by the Panamá or the Honduras route.

The BISHOP of HONOLULU said he had made several transits over the Isthmus of Panamá, and could not concur in the ground taken by the advocates of the Nicaragua route, viz., that the one over Panamá was unhealthy. In 1862 he stayed most part of a week there with his wife and children, and two clergymen with their families, and they found the place healthy, and suffered no inconvenience. The intelligent Consul there, Mr. Henderson, had often said, as a *tropical* climate, that of Panama city was one of the very best, and that he enjoyed there very good health. At Aspinwall or Colon, on the Atlantic side, the manager of the railway, who had had an experience of above ten years' residence there, with his family, said, "if a person took the proper precautions usual in the tropics, and was careful about stimulants, for example, he might live as long there as anywhere else." The chaplain had told him (the Bishop) the same. He mentioned these facts in vindication of the

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[*] See Plan of Port St. Juan surveyed by Mr. Peacock in 1831, with the gradual growth of the spit from year to year up to December, 1858, in the Map Collection of the Royal Geographical Society.

Panamá railway route, from whose managers he (the Bishop) had ever received much personal kindness and attention.

Admiral **Ommanney** satd he was stationed off the coast of Central America in command of H.M.S. *Brunswick*, 80 guns, for five months, most of that time lying off Colon, and could confirm all that the Bishop had just said as to the salubrity of Colon and the advantages of the Panamá railway. The climate of that locality when the railway was first commenced was in bad repute; since then it had improved, owing to the clearance of timber and vegetation along a belt of country on each side of the line, through the dense virgin forest which covers the Isthmus: the prevailing wind which blows from the N.E. direct from the sea over Colon renders that place healthy. His ship's company, consisting of upwards of 800 persons, enjoyed good health; he had the satisfaction to leave the station without the loss of a man by death from the climate. The present survey of Nicaragua, with regard to opening out an access into that country, was a good work accomplished, and reflected very great credit on those who had conquered the difficulties and privations; any work tending to develop the natural sources of wealth in Central America was a benefit to mankind. The proposed line as a means of interoceanic communication between the Atlantic and Pacific would be of little value unless there were good ports at each terminus capable of receiving the largest passenger ships: on this point he was sceptical. He had visited the Mosquito coast, and feared that no harbour existed at Monkey Point suitable for the object. He considered it a dangerous coast and subject to boisterous weather; he was once caught off Monkey Point on a lee-shore with a heavy gale, in a line-of-battle-ship; had difficulty to work off under storm-sails, aided by steam-power, against the heavy sea rolling along the coast. The advantage of the short transit by the existing Panamá line, which has good towns at each terminus, would command the preference for passengers to the more lengthened route by the proposed scheme.

Mr. **Collinson**, in reply, adverted only to one point—the harbour at Monkey Point. He had had considerable experience of that harbour as to shelter. In 1863, in one of the most violent northers on that coast, he was for three days, in that harbour, in one of the Royal Mail steamers, and was completely sheltered. On the contrary, at Colon, during one of these northers, the Royal Mail steamer *Avon* was blown right on shore against the landing stage, which was entirely destroyed. She could not get out with full steam on.

The meeting then adjourned.

Third Meeting, December 9th, 1867.

SIR RODERICK I. MURCHISON, Bart., K.C.B., President, in the Chair.

Presentations.—*Rev. A. Raleigh*, D.D.; *Edward Spicer, Esq.*; *J. H. Tritton, Esq.*

Elections.—*Frederick Shirley de Carteret Bisson, Esq.* (Lieut. R.I. Militia); *James Chapman, Esq.*; *Andrew Halley Knight, Esq.*; *William McArthur, Esq.*; *Hon. John McLean, Esq.*; *Richard Ramsden, Esq.*, B.A. Trin. Coll., Cambridge.

Accessions to the Library, from November 25th to December 9th.—'Voyage sur le Coté Orientale de la Mer Rouge dans le pays d'Adal et le Royaume de Choa,' par C. G. K. Rochet d'Héricourt, 1841. Purchased. 'Travels in Nubia, Egypt, Holy Land, Mount Lebanon, and Cyprus, in the year 1814,' by Henry Light, 1818. Purchased. 'Question d'Abyssinie au Peuple de la Grande Bretagne,' par J. Cozzika: Constantinople, 1867. Presented by the Author. 'Generall Historie of the Turkes,' etc., by Richard Knolles, 1603. Purchased. 'Voyages dans l'Inde par le Prince Alexis Soltykoff:' Paris. Purchased. 'The Birds of South Africa,' a descriptive catalogue of, by Edgar L. Layard: Cape Town, 1867. Presented by G. Frere, Esq. 'Climate and Meteorology (Physical and Medical) of the West Coast of Africa, with Hints to Europeans for the preservation of Health in the Tropics,' by James Africanus B. Horton, Esq., M.D., 1867. Presented by the Author. 'The Itineraries of William Wey, Fellow of Eton College, to Jerusalem, A.D. 1458 and 1462; and to St. James of Compostella, A.D. 1456,' from the original MS. in the Bodleian Library, 2 vols. Presented by the Earl of Powis. 'South Atlantic Ocean: a Sailing Directory for the Ethiopic or South Atlantic Ocean, including the Coast of South Africa,' 5th edition, by A. G. Findlay, Esq. Presented by the Author. 'The Art of Travel; or Shifts and Contrivances available in Wild Countries,' by Francis Galton, Esq. 3rd edition. Presented by the Author. A small Miniature in marble, by Taffe, of John Pinkerton, Geographer, dated 1798. Presented by J. W. Lowry, Esq.

ACCESSIONS TO THE MAP ROOM SINCE THE LAST MEETING, NOV. 25TH.—Switzerland: Eastern part of the Canton of Grisons, showing the Glaciers of the Lower Engadine, on 2 sheets, by J. M. Ziegler, Corresponding Member. Presented by the Author. Ditto: a Geological Map, by M. B. Studer and A. Escher, on 4 sheets. Compiled and presented by J. M. Ziegler. Ancient Map of Egypt, Nubia, and Abyssinia, and Sources of the Nile, from Sebastian Munster, 1550. Presented by Dr. T. Murie. Atlases:—A Pictorial Atlas of the Victoria Falls, Zambesi River, sketched on the spot by T. Baines, Esq., containing 11 chromo-lithographic engravings; also 44 photographs of South African scenery. Presented by the Author.—Hydrographical Atlas of the Rio das Velhas, a tributary of the Rio San Francisco, South America. Purchased.—The Handy Royal Atlas, by A. K. Johnston. Presented by the Author.—Missionary Atlas of South Africa, by Dr. R. Grundemann. Presented by the Author.

The PRESIDENT announced that since the last meeting he had received letters of the most satisfactory description respecting the "white traveller" seen in the interior of Africa, whom many persons, himself included, were disposed to think could be no other than Dr. Livingstone. The letters were, in his opinion, singularly corroborative of the hopes which the former tidings had excited. It would be remembered that the news of a white man in the interior was communicated to Dr. Kirk at Zanzibar by a native who had served in a trader's caravan, and who had stated that the leader of the caravan, and other men belonging to it, were at Bagamoyo on the mainland, where they might be seen and questioned on the subject. Since then Dr. Kirk and Mr. Churchill had been to Bagamoyo and seen these men, and the result was communicated in these letters. The first letter was from Mrs. Kirk to himself:—

"Zanzibar, Oct. 11, 1867.

"The white traveller, concerning whom Dr. Kirk wrote to you on the 28th of last month, according to further accounts, stayed five days at the village where the caravan was, and then went on to the next chief. The white man was of moderate height, not stout, wore a white coat and trousers, and a black cloth cap, round which he sometimes wrapped a white cloth. He gave the chief a looking-glass, eight yards of flannel, and a tin box. He went on northwards. He gave a letter to Bunduki, the leader of another caravan, which is expected on the coast in a month. He had a compass and other instruments which he used at night. He could converse in Suaheli, but did so imperfectly, and with the Nyassa idiom, 'like Dr. Kirk.' He had a beard; three of his party carried boxes, four had bags of beads, the others miscellaneous articles. This is all the information we have, and Dr. Kirk wishes me to tell you he has hardly any doubt at all that it is indeed Dr. Livingstone. If it is not, who can it be? There is no other white man in the interior that we know of, and a Portuguese from the west would not speak Suaheli. There is also a rumour that a white man has been seen in the country of Uruwa, west of Ujiji, but as yet we have not been able to trace the report. It was heard casually mentioned in a conversation between two natives. Dr. Kirk sent a large parcel of guns, letters and other things to Ujiji to meet Dr. Livingstone, who, if he hears in any way that such things lie there for him, it would probably influence his movements.

"P.S.—Mr. Brenner, the companion of the late Baron von der Decken, is just returned to Zanzibar from the River Dana, which he has ascended for a distance of between 100 and 200 miles from the sea. He describes the river as deep and navigable for small craft, and it flows through a rich country.

"HELEN KIRK."

Hitherto Dr. Kirk, as the meeting was aware, had been an unbeliever in the existence of Livingstone, in consequence of the impression made upon his mind by the story of Moosa. It would be seen that he had now changed his opinion, and come round to the view which he (the President) had long ago expressed.

The other letter was to Mr. Webb from Dr. Kirk himself:—

"Zanzibar, Oct. 9, 1867.

"The interesting discovery that a white man had been seen seven months ago to the south of Lake Tanganyika, induced Mr. Churchill the Consul, and myself, to go to Bagamoyo, a place on the coast, the point of arrival and departure of the Ujiji caravans. The result of our visit has been to find two other men who also saw the wanderer in the interior, at Marungu, and to place his existence apparently beyond doubt. We have also learned something about his personal appearance, his escort, and the route he was taking, and have been told that letters were given to one of the head-men of another caravan that was at Marungu. This man, we have since been told, is a well-known man; so that on his arrival from the interior, expected in the course of a month, we may not only have our curiosity satisfied, but I sincerely hope our best wishes for our dear friend Livingstone realised. I hope we shall find that he has been successful, and is pushing his way to the Albert Nyanza, thence to emerge, *viâ* the Nile, on the Mediterranean. He will have been the first man who has not only crossed the continent, but has passed through the whole length of Africa, from the Cape of Good Hope to the mouth of the Nile. But the essential part of his work will have been done before he reaches the Nile, and he may safely return towards Zanzibar, if so minded, with laurels sufficient to constitute him the greatest of all explorers, and the African traveller *par excellence*. You see I am very sanguine that our friend is still alive. The manner in which we obtained the testimony was very satisfactory. In the first place, I picked up the news amongst the native traders. I then addressed the caravan people, and drew out their story while they were unsuspicious of its interest; so that neither Hurdee traders nor Suaheli men had an object to tell lies, nor any idea of how to act if they wished merely to please. Besides, our conversations were carried on without an interpreter, and, although making no pretence to a full knowledge of the language, I knew quite sufficient to be able to express myself, and dispense with that fertile source of confusion, an interpreter. I need not repeat all we heard; most of what is im-important will be published before this reaches England. With the prospect of letters from Livingstone so near, we may well refrain from all speculation on the subject of his geographical discoveries.

"J. Kirk."

The President added that on the receipt of these letters he had written to Lord Stanley, who had informed him that no despatches from Zanzibar had reached the Foreign Office at present. He had no doubt before the next meeting of the Society all these despatches would be received. He was sure there could be very few persons who would not participate in the sanguine hopes he entertained that their dear friend, Dr. Livingstone, would not only return to them, but, as Dr. Kirk said, covered with the laurels which he would have so gloriously won.

Mr. John Crawfurd thought the information they had just received was somewhat more satisfactory than the former tidings. Still he confessed that he did not see in the information all the satisfaction that the President seemed to feel. He had a very high opinion of Dr. Kirk, and thought he was one of the best observers who had ever travelled in Africa; still, he must plainly say, that he was yet disposed to place considerable reliance on Moosa. There was one part of the information communicated on the former occasion on which he wished to make a remark, and that was the photograph which the native carrier was said to have recognised for Livingstone, out of several that were shown to him. Now he held it to be totally impossible for a native African, unaccustomed to pictorial representations, to pick out a particular portrait of a white man, dressed, as he represented, in European costume with a white cloth round his head.

The following Paper was then read:—

Sketch of a Journey through the Interior of China, from Canton to Hankow. By A. S. Bickmore, Esq., M.A., Massachussetts.

The author left Canton on the 7th August, 1866, with the intention of following a route proposed for a future railway to Hankow, *viâ* Quei-lin and the banks of the Siang affluent of the Yang-tse. Travelling up the Si-Kiang to Wu-chau, he ascended the Cassia River to Hingnan, and near that place found that this northern affluent of the Canton River was connected by an artificial canal with the great Siang River flowing northward into the Yang-tse. Being autumn, and the season unusually dry, the upper courses of both the Cassia and the Siang were encumbered by rapids; at other times he believed it would be possible to travel from Canton, through the interior of China, to Shanghai in the same boat. Near the populous city of Quei-lin Mr. Bickmore narrowly escaped massacre at the hands of the unruly populace, notwithstanding the protection afforded him by the mandarins. The whole country had been in a state of anarchy since the Tae-ping rebellion, and even boats belonging to the Imperial Government, with mandarins on board, were frequently plundered by hordes of ruffians on the banks of the river. Henceforward his Chinese guides kept him closely confined in his boat, that he might escape observation and reach the Yang-tse in safety. The canal connecting the Yang-tse Basin with that of the Si-Kiang can only be used by boats drawing 2 feet of water. The water is kept in by dams built across wherever a rapid would occur, and allowing an escape only through a small gap, deep enough for a single boat to pass. At Sichang, on the Siang River, are situated the principal coal-mines of the region, and some fifty boats were seen loading. The mines are nothing more than deep pits in the sides of the hills, and consequently only surface-coal is obtained. It is to be expected that better coal would occur below the water-level, but as soon as the miners come to water they are obliged to abandon the mines for want of proper pumping apparatus. From Sichang to Moukden, north of Pekin, there is a continued series of coal-mines on the flanks of the elevations that form the western border of the great plain. A striking spectacle was presented, on arriving at the Tung-ting Lake, at the junction of the Siang with the Yang-tse. A heavy northerly wind had been blowing for six or seven days, and few or no boats had been able to proceed. A southerly breeze then set in, and all the boats that had been harbouring in the many creeks and bays came out, and at sunrise such a sight was obtained as could only be seen in a land where the population is numbered by the hundred million. As far as the eye could reach the surface of the lake was thickly feathered with white sails, some in sunshine, some in shadow, and some in the dim distance, apparently gliding on a thin film of air above the water. Four hundred and forty boats were counted in sight at one time. The Poyang Lake, lower down the river, is of the same character. It has been noticed that these great lakes have near them a group of high mountains: this is only another way of stating that where there has been an unusual elevation there has been a corresponding depression.

This Paper will be published entire in 'Journal,' vol. xxxviii.

The PRESIDENT asked the Society to return their hearty thanks to the author of the paper,—a young American gentleman, who had accomplished a most remarkable journey. Mr. Bickmore had been a pupil of Agassiz, and had travelled in the East for scientific purposes. Leaving Boston some four years ago, he had traversed nearly the whole of the Eastern Archipelago, including the island of Sumatra, upon which it was his intention to communicate another paper to the Society at some future day. He had finished his extensive travels by making this remarkable journey through the interior of China, described in the paper, visiting Japan, and crossing Siberia on his way to Europe. He arrived in this country about a fortnight ago, and it was his intention to be present at the last meeting of the Society, to read his own paper,—one of the most interesting memoirs that had been brought before them for many years. On the eve of the meeting, however, he found that he should be obliged to leave at an early hour, in order to catch the steamer at Southampton on his return to America, and thus we had been deprived of the advantage of hearing him personally. The information in the paper was of great importance to our commercial community, because we are about, next year, to have a new treaty, and should probably have opportunities of opening out a more extensive commercial intercourse with China. Mr. Bickmore had described in the most graphic manner the desolation and barbarism of those provinces over which the Taepings had extended their devastations. That state of things, fortunately, had passed away, and we might hope that the empire of China was now recovering. Mr. Bickmore was the first European who had performed this journey *viâ* the Cassia River and the canal leading to the Siang affluent of the Yang-tse, at least we had no record of any previous traveller.

Mr. JOHN CRAUFURD said he had a great respect for the enterprising gentleman who was the author of the paper. In the course of his travels he had crossed the island of Sumatra, one of the largest in the world, and one of the least known, had visited Java and the Moluccas, and, after this remarkable journey through China, had visited Japan, the Kurile Islands, and the Russian settlements on the Amoor. He had no doubt Mr. Bickmore would publish a full account of his travels. He had shown us what a singular people the Chinese are. While the Taeping rebellion had been going on, our trade with the country had been from year to year increasing, such was the extraordinary perseverance and wonderful industry of these people. He believed our commerce with China exceeded that of other countries, American and European. It amounted to 40,000,000*l.* of annual imports, and about the same total of exports. But it would be a long time, in his opinion, before there would be any railways in China. A project had been recently brought forward for a railway from India through Burmah into China. Such a line would have to traverse, for several hundred miles, the two worst provinces in China—Yunan and Kwangsi—before it could reach those districts from which we procured the two great staples of China, tea and silk. It would be imimpossible to carry out the project, and he hoped the British public would not be disposed to invest their money in Chinese railways. He was happy to think that Mr. Bickmore's labours had received the approbation of the Society. He hoped to see a further paper from him, for he was sure it would be as worthy of attention as the one which had just been read.

Mr. Bickmore had sent the following letter to the President, on leaving England:—

"Hamburg Steam-ship *Borussia*, Southampton,
Nov. 26, 1867.

"MY DEAR SIR,

"I should be doing myself, and my many American friends, a great injustice, were I to leave your shores without earnestly expressing to you, and asking you to express to the honourable body of which you are the President—

and through them to the public—my deep sense of gratitude for the many kind attentions I have had the honour to receive at the hands of many of Her Majesty's officers during my travels in China and Japan.

"I am especially indebted to Vice-Admiral George King, who at that time commanded Her Majesty's fleet in those seas, for an open letter, addressed to all the captains under his orders, asking them to receive me on board and take me to such places as they might be visiting, whenever I wished to avail myself of the privilege.

"I sincerely trust that when any English gentleman is travelling within our borders, or on seas frequented by our navy, for scientific purposes, he may receive the same polite attention.

"I shall further ask you, if you deem it proper, to read this note when my paper comes before your Society, and deposit it in your archives.

"With many thanks for your personal attention during my late visit to London, and an expression of my highest consideration,

"I have the honour to be, your obedient servant,

"ALBERT S. BICKMORE."

"*Sir* RODERICK I. MURCHISON, *Bart., President of the Royal Geographical Society, London.*"

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Extension of Electric Telegraph Lines in Queensland.*

THE various surveys which have been made during the last two years in connexion with the extension of the telegraph system in Queensland have done much towards completing our geographical knowledge of the northern parts of this extensive and important colony, besides promoting the settlement of the country. The object of the promoters of these surveys is the eventual connexion of the 9000 miles of the Australian telegraph system with lines from Europe *viâ* India and the Dutch settlements in the Malay Archipelago. It is satisfactory to note that even in Queensland the telegraphs pay already about 2 per cent. on the capital expended. The following is an extract, bearing upon the subject, from the Report of Mr. W. J. Cracknell, the Superintendent of Electric Telegraphs in Queensland, dated May 1, 1867:—

"I cannot refrain from pressing on your consideration the desirability of commencing, at the earliest possible moment, the proposed extension of the northern lines from Bowen, Port Denison, to the Gulf waters. On the 19th of March, last year, the late Mr. Frederick Walker was despatched from Rockhampton, with a well-equipped party, to explore the country between the east coast and the Gulf of Carpentaria, for the purpose of discovering the most eligible route for the proposed extension to Burketown. Taking a final departure from Townsville, Cleveland Bay, he so far effected the object of his mission by a cursory survey from that point to the Gulf settlement; but, unhappily, to the loss of the public service, whilst with like purpose returning thence by a different route to Cardwell, Rockingham Bay, he died in camp at Floraville, Leichhardt River, on 19th November, 1866. In consequence of Mr. Walker's illness and death, his journal and papers are incomplete, and, in order to have a full record of the proceedings of the party, I requested Mr. H. E. Young, second in command, who has successfully carried out the purpose of the expedition, to furnish me with a complete journal. The 670 miles of country traversed on the outward journey is for the most part badly timbered; a plentiful supply of good quality being only obtainable for a distance of 154 miles; indifferent timber for 131 miles, and the remaining 385 miles is entirely devoid of any description of timber that could possibly be made use of for telegraphic purposes. It will be observed, on referring to the explorer's journal, that the distance travelled by this route is slightly in excess of that *viâ* Cardwell, added to which the scarcity of timber would render the construction of a line through the country in question by far too expensive. From information now available, I am led to believe the most eligible route for the Gulf extension will be to continue the line from Bowen *viâ* Townsville and the eastern side of the coast range to Cardwell; thence by the new gap in Seaview Range (about 25 miles north-west from Cardwell), *viâ* Mount Surprise, gap in Gilbert Range, Gilbert River, to Smith's Station; thence by the return route of exploring party to Burketown,—a total distance of 662½ miles. From Bowen, by this route, to within 107 miles of Burketown, the country is, on the whole, well timbered and well watered; there is, therefore, no impediment, either from lack of material or otherwise, to the tolerably easy and economical construction of a line of a similar character to the Rockhampton-Bowen section, say 20 posts to the mile. To obviate the scarcity of suitable timber on the 107 miles from Burketown referred to, I would propose to use iron poles, to be conveyed by sea to convenient points on the coast, and as they will then only require to be carted a very short distance over level open country peculiarly easy of travel, the expense of land carriage will in such case be trivial; indeed, the cost of this portion will, I apprehend, be much less than if wooden poles were to be carted from a distance, and not much in excess of what it would be if suitable timber were available nearer at hand.

"Recent advices plainly indicate that the successful establishment of telegraphic communication between the United Kingdom and America has stimulated the previously existing keen demand for the extension of telegraphic communication throughout the world. It is not, therefore, surprising to find public attention actively directed to the expediency of improving and extending the Indian lines, nor yet to find proposals afloat, the which, when carried into execution, will draw the telegraphic systems of India, Europe, and America, considerably nearer the Australian continent.

"I learn from the report of the General Superintendent of Electric Telegraphs, Victoria, for 1866, that this Company is still negotiating with the Imperial Government, and that, at a meeting in London of gentlemen interested in this matter, certain resolutions were drawn up and presented to the Right Hon. the Earl of Carnarvon, Secretary of State for the Colonies, which had been agreed to and signed by the promoters of the meeting.

"Happily, a considerable section of the intermediate distance between India and Java is in course of construction by the Netherlands India Government, namely, from Batavia through Sumatra to Singapore; and the Eastern Asia Telegraph Company propose to carry their line by land from Moulmein, or some other point in the Tenasserim provinces where the British Indian line terminates, passing down the Malay Peninsula, *viâ* Penang and Malacca to Singapore, on the completion of which Banjoewangi (East Java) will be in direct telegraphic communication with India, Europe, and America. If any serious obstacle to laying a cable thence to the north coast exists, it will be found in the coral bottom of the intervening sea; but it remains for a more minute survey than has hitherto been made to discover whether a safe bed cannot be obtained. In the mean time, provision of fleet steamers to ply between the termini has been suggested. It is, however, hardly necessary upon the present occasion for me to discuss the feasibility of this or other proposed expedients to the same end; but, in view of the circumstances and exigencies of the times, both without and within the Australian colonies, in reference to the necessity for means of more prompt communication between Australia and the United Kingdom, it can but be universally admitted that the Gulf extension should be carried out with the least possible delay."

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2. *Exploration of the Mouths of the Flinders River, Gulf of Carpentaria.* Extracts from a Report of Mr. W. LANDSBOROUGH to the Governor of Queensland.

(Communicated by the COLONIAL OFFICE.)

Burketown, Gulf of Carpentaria, 9th February, 1867.

FOR some time past the settlers on the Flinders River have been most anxious to have the inlets examined to the eastward of the Albert River, in the hope of finding a more conveniently-situated place for the shipment of their produce than Cleveland Bay and this port, to which places they have to send it at present. Last month an opportunity occurred of examining Morning Inlet, through the kindness of Captain Ellis, master of the schooner *Lily*. With Captain Stokes' admirable work in a person's hands, and the chart of the coast,* it is a very easy matter to find any of the inlets by coasting in a small boat along the shores of the Gulf; but with a vessel of considerable draught it is not so easy, as the shallowness of the water all along the coast renders it necessary to keep so far off the land that it is difficult to distinguish the openings. Captain Ellis, however, skilfully succeeded in finding, by moonlight, Morning Inlet, on the 23rd of January.

Leaving the *Lily*, Mr. Phillips and myself went to the inlet in the pilot-boat, and, after examining it we felt doubtful that this was the inlet we were in quest of, as we could not discover any promontory corresponding with Middle Point of Captain Stokes, so we returned to the *Lily*. Afterwards, we got Captain Ellis to coast to the eastward sufficiently far to decide that if the inlet we had been at was not Morning Inlet, that Morning Inlet must be to the westward, so we then got him to put the ship about, and sail in that direction. It now became my intention to take to the small boat, with the object of more particularly examining the coast; and having arranged with Captain Ellis to meet him, after the survey, either off Gore Point or the Albert, we started. Coasting near the land from Gore Point eastward, we were quite satisfied, on our arrival, in the afternoon, at the inlet we had been at previously, notwithstanding the discrepancy I have mentioned respecting Middle Point, that it was Morning Inlet. Middle Point is very low, with mangroves, and it is not improbable that the missing part may have been washed away since it was surveyed by Captain Stokes. We got into Morning Inlet about 4.45 P.M. Our progress was so rapid, owing to the tide being in our favour and the straightness of the various reaches of the river, that before midnight we reached latitude 18°, a point further south than any boat had previously reached in any other river of Carpentaria. The place we reached is midway between the Leichhardt and Flinders rivers, and about 70 miles east of the Albert Settlement. The river is narrow, but were it required as an outlet it would be adapted for vessels of a small draught of water not exceeding 6 feet, and could be navigated within 10 miles of the point we reached with the pilot-boat. Like all the rivers of Carpentaria, its banks are low, where the difficulties of navigation are few; but as you approach higher up, where good situations for townships present themselves, the river becomes more impeded by shoals and other obstacles. Some settlers whom we met agreed that the Norman River, which they said was situated 15 miles to the eastward of the Flinders, was apparently superior to Morning Inlet.

Late in the afternoon we left Morning Inlet in search of the *Lily*, and anchored near Gore Point. Next morning we pulled to the *Lily*, which was about 10 miles to the westward, and informed Captain Ellis of the arrangements we had made. Captain Ellis, after giving us what provisions he could spare, sailed to Sweer's Island, and we left to go in an almost opposite direction to Bynoe Inlet. In the evening, as the weather was squally, we were exceedingly glad to get safely into an inlet named Ell Creek by the settlers. Ell Creek is the first of any consequence to the west of the Flinders, in the direction of Morning Inlet, that is easily distinguishable from the offing to the westward of the Flinders. We were detained there in consequence of squally weather until late in the afternoon of the following day, and during our stay went, in search of water, inland to the westward. The country consists of fine grassy plains, intersected with mud flats, and is as fine pastoral country as any that I have ever seen in Queensland so near the seaboard. After leaving Ell Creek we sailed to the Flinders, and took shelter for the night. The entrance to the Flinders merits the favourable description given of it by Captain Stokes, and is easily distinguishable from the sandy beach on the east side of the river, mangroves being generally the prevailing feature elsewhere.

Proceeding to the Bynoe, which we then supposed was the Norman of the settlers, situated 10 miles eastward from the Flinders' entrance, we were much pleased to find the soundings most satisfactory, and coinciding with the description of Captain Stokes, its discoverer, who found the depth of water at the entrance to be as great as that of any other river of Carpentaria, but time did not admit of his surveying it above a few miles. Further up the river, for a long distance beyond where it was previously surveyed, we found no rocky bars, and a depth of from 2 to 6 fathoms; but in consequence of having no water we were obliged to push up the river at night, and could only take soundings. The survey of the river Mr. Phillips left for the passage down, and the second evening we were nearly as far up as the boat could go, and the water drinkable. A walk on the following day, of nearly 2 miles, along the bank of the river, brought us to where the land party had crossed, and in the evening we shifted the boat to the crossing-place, where we remained two days, in the expectation of the land party finding us. At the expiration of that time Mr. Phillips and myself resolved to go in search of Messrs. Smith and Company's station for a supply of rations, of which we had run short. I had been led to suppose that Smith's station was 6 miles up the Flinders from where it was navigable, and I supposed that I could make the station in about 15 miles. When we had reached 2 miles we came upon a large salt-water river, and when we had traced it some distance to the northward we concluded it was the Flinders. Next day we went up the river without finding any recent traces of stock, which gave us but little prospect of finding Smith's station. The following day, having given up the idea of finding Smith's, we followed the river up, intending to make Mr. Halloran's station, and came to a single dray-track which led us to it early on the morning of the third day. The country we traversed was excellent, and the sheep at Mr. Halloran's, by their fine condition, testified to its being well adapted for pastoral purposes. From Mr. Halloran we learned that Mr. Smith's station was situated on Armstrong Creek, a western tributary of the Flinders.

The Bynoe we found was the main branch of the Flinders, and discovered that these rivers separated from the one channel, at a point about 5 miles above where we reached with the boat. The settlers had mistaken the Bynoe for the Flinders in consequence of its being the main branch. The country is excellent for pastoral purposes, and has fine, dry, hard ridges, presenting good sites for building. At 2 miles below the boat these fine ridges lie close to the river, and about 2 miles below the lagoons there is a range at least 200 feet high, which, from the information I gathered from the settlers, extends to the Norman, about 15 miles.

I cannot conclude without again expressing my firm belief—strengthened by the experience I have lately gained—that Carpentaria country must become a territory of the greatest importance, owing to the vast extent of fine available country which has proved itself singularly well adapted for sheep and cattle.

3. *Great Volcanic Eruption in Iceland, in August,* 1867. Extract of a Letter from Dr. HJALTELM to J. W. EVANS, Esq.

(Communicated by Sir R. I. MURCHISON, Bart., President.)

AT the end of August a most remarkable volcanic eruption took place in our island. Its story runs shortly thus:—

On the 29th of August, by somewhat misty weather, but tolerably hot, the temperature being about 13° of Celsius (55° 40′ Fahr.), a tremendous sulphureous odour was found all over our little town. The barometer was about 29·4, and very little wind blew from the S.E. I immediately supposed that an eruption might be going on in the east volcanoes; and the next day showed that my prediction was quite right. In the evening heavy shots were heard beneath the mountain Esja, and a rolling, like thunder, was heard underground. On the 30th August, by clear weather, and a small breeze from the S.E., the same odour was felt all over the southern part of our country, and in the evening, at about 7 o'clock, a heavy fire was seen in S.E. to E. direction from hence. It was a white blue flame, like burning sulphur, and this lasted all night, and could be seen more than 100 miles out at sea. Lightning and rolling thunder were also heard in all our mountainous regions, but no earthquake was felt, neither here in Reykjarvik nor in the mountainous regions, so far as we know. At the same time as the eruption, with its tremendous flame, was seen here in our town, it was also seen in the northern part of our island; and seen from Myvatn it was directly in a south direction. A merchant vessel sailing at that time south of Portland saw the eruption in a north direction; and in the South Skaptafells Sysla grey white ashes fell on the grass. This remarkable eruption lasted only for three days, viz., the 29th, 30th, and 31st of August, but after that time only a whitish-grey cloud was seen in the same direction.

In the beginning we were here at a loss to find out the exact place of this tremendous but very curious eruption. Seen from hence it might be very near Stekla or Kandakampa, an old volcano which in former days, in 1449, poured out a very destructive lava-field; but it was by travellers soon found out that it could be in neither of those places. Now all people from the east part of this country agree in the opinion that this eruption must have been on the north side of Skaptár Jókull, and the same opinion is held by people coming from the north.

To tell the truth, this volcanic eruption was one of the most curious ones we have heard of. Its sudden appearance, without any earthquake, its enormous flames, which overlooked all the high mountains, its accompanying strong sulphureous odour, which was perceived, as far as we know, all over the island, make it one of the most extraordinary volcanic phenomena I have heard of. I was only able to collect some few grains of the small quantity of ashes which fell on the ground, and found it consisting of a little pumice-dust and pure sulphur. Go and tell the excellent Sir Roderick Murchison about it, and I will, with great pleasure, give him the best description I can.

I must tell you another remarkable circumstance which I have observed this year; it is a considerable elevation in the temperature of the sea, and a great force in the Gulf Stream. The captain of the yacht *Marquis of Bute* told me that the Gulf current was running with unusual speed, and the same has been observed by our fishermen. The waters have, on account of this, during the spring tide, been extraordinarily high. It is most likely also due to this that we have this autumn enjoyed a very high temperature, for the most part between 8° (46° 4′ Fahr.) and 12° (53° 6′ Fahr.) of Celsius, and have as yet very little or no snow at the tops of our southern mountains.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[Issued May 7th, 1868.]

SESSION 1867-8.

Fourth Meeting, *January* 13, 1868.

Sir RODERICK I. MURCHISON, Bart., K.C.B., President, in the Chair.

Presentation.—*A. M. Bethune, Esq.*

Elections.—*A. L. Elder, Esq.; J. A. B. Horton, Esq.*, M.D., &c.; *Robert Jardine, Esq.*, B.A.; *Eugene Morris, Esq.; M. C. Morrison, Esq.; Augustus H. Mounsey, Esq.* (H.M. Legation, Teheran); *George Macnair, Esq.; John F. Pownall, Esq.* (Magistrate for County of Middlesex); *John Pender, Esq.; J. B. Redman, Esq.*, C.E.; *H. P. Stephenson, Esq.*, M.I.C.E.; *Dr. Thomas Staley* (Bishop of Honolulu); *Thomas Osborne Stock, Esq.*, M.P.; *Henry A. Tilley, Esq.; Major George H. Waller; Robert Watson, Esq.; Edward B. Webb, Esq.*, C.E., &c.

Accessions to the Library from December 5th, 1867, to January 13th, 1868. — 'The Middle Kingdom: a Survey of Geography, Government, &c., of the Chinese Empire,' 2 vols., by J. Wells Williams. Presented by Dr. Lockhart. 'Climate and Meteorology of the West Coast of Africa,' by J. A. B. Horton, M.D. Presented by the Author. 'Coal Deposits, New Zealand,' by James Hector. Presented by the Author. 'Aus dem Orient—Nil, Sinai-Halbinsel und in Syrien,' by Dr. Oscar Fraas. Presented by the Author. 'The Sailor's Word-Book, a Digest of Nautical Terms,' by Admiral Sir E. Belcher, K.C.B. Purchased. 'South Australia: North Territory Exploration.' Presented by F. T. Dutton, Esq. 'Voyage aux Provinces Brésiliennes de l'Amazonie en 1860-61.' Presented by Sir Woodbine Parish. 'Asowschen Meeres,' von G. V. Helmersen. 'New Zealand; its Physical Geography, &c.,' by Dr. F. Hochstetter. Stuttgart, 1867. Presented by the Author. 'Jamaica in

1866; a Narrative of a Tour through the Island,' by T. Harvey and W. Brewin. Presented by the Authors. 'The Adventures of my Grandfather,' by J. L. Peyton, Esq., 1867. Presented by Colonel Peyton. 'Etudes sur les Affinités Chimiques,' par C. M. Guldberg et P. Waage. Presented by the Christiania University. 'Bulletin de l'Académie d'Hippone, Soc. de Recherches Scientifiques et d'Acclimatation,' Bone, 1866. 'International Company of the Columbian Canal.' Presented. Dr. L. G. Blanc's 'Handbuch, Geschichte der Erde und ihrer Bewohner,' Auflage von Dr. H. Lange. 4 parts. Presented by Dr. Lange. 'On the Nature and Discoloration of the Arctic Seas,' by R. Brown, Esq. Presented by the Author. 'School Geography,' by James Clyde, 10th edition, 1866. Purchased. 'Le Pilote du Golfe Persique.' 'Pilote du Golfe d'Aden.' 'Annales Hydrographiques,' to date. 'Catalogue des Cartes.' 'Routier de l'Australie, Côtes N., N.O., et Ouest,' par Charles Yule, R.N., traduit par Besson. 'Renseignements Nautiques sur quelques Ports de l'Océanie, de la Nouvelle Hollande et de la Mer Rouge,' par R. Foy, 1866. 'Routier du Golfe du Méxique en France,' par M. B. F. Gasset. 'Routier des Côtes sud d'Afrique, du Cap de Bonne-espérance, au Cap Gardafui,' par A. F. B. de Horsey, M.R.A. 'Routier de l'Ile Jersey par J. Richards, R.N.,' par Jules Vavin, 1866. 'Considérations général sur la Mer Méditerranée; Resumé des Vents, Courants et Routes de cette Mer,' par A. Le Gras, 1866. 'Mer de Chine,' par M. A. Le Gras. 'La Nouvelle Calédonie.' 'Le Côté Ouest de la Corée.' All presented by the Minister of the French Marine. 'Euphrates Railway, Papers relating to.' Presented by Mr. Andrews. 'Meteorological Observations, Sydney,' by G. R. Smalley, Esq. Presented by the Sydney Observatory.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF DECEMBER 9TH, 1867.—Ethnological Map of Russia in Europe, on 2 sheets. Presented by Sir R. I. Murchison. Three small Maps of Australia, showing the routes of Warburton, Walker, and McIntyre, by Dr. A. Petermann. Five Maps of Abyssinia, by Antoine d'Abbadie. Presented by W. D. Cooley, Esq. Four Maps of Queensland, showing the proposed routes of the Electric Telegraph, by Messrs. Walker and Young. Two sheets of the Topographical Map of Sweden. Presented by Major-General J. A. Hazelius, Chief of the Topographical Corps of Sweden. Map of North-Western America, showing the territory ceded by Russia to the United States, by B. Peirce. Presented by the United States' Naval Department. Atlas to Fay's Great Outline of Geography. Karte von Ost-Sudan, showing the route of Carl Graf Krockow von Wickerode.

Map of the German Colony in the Brazilian Province of Rio Grande do Sul. Presented by Bruno Hassenstein, Esq.

The PRESIDENT stated that before proceeding with the business of the evening he had to announce that he had that morning received a letter from Dr. Kirk, respecting Dr. Livingstone, which he would read :—

"DEAR SIR RODERICK, "Zanzibar, 29th October, 1867.

"I write now only to assure you that nothing further has reached us regarding the traveller in the Lake Regions, who must without doubt be Livingstone, since we have news of him from Quiloa as having been seen west of Nyassa, where gold is found.

"Bunduki, the native to whom the letters were given, has not yet reached the coast, being delayed, as we hear, by carrying ivory in double journeys from village to village; and he is still too far off to make it of any use sending men to receive the letters which he has in his possession. We must bear patiently these African delays, and live on the hope which these rumours encourage.

"It will be some time before we can write to Johanna; but I hope that Moosa and his companions may be well watched, and, when the time comes, severely punished for the misery they have caused. They, however, press their claims for salary, and have even sent men here in the hope of getting their wages paid.

"Mr. Brenner goes in the same vessel with me to Lamoo. I go on a short leave, the first I have had since I came out. He goes to explore the Dana River, which opens into Formosa Bay. My next letter, I hope, may be accompanied by those of Dr. Livingstone.

"JOHN KIRK."

The following papers were read :—

1.—*Explorations in the Isthmus of Darien.* By M. LUCIEN DE PUYDT.

IN this Memoir M. de Puydt communicated the scientific results of two explorations which he made of the Isthmus of Darien in the years 1861 and 1865, having for object the discovery of a practicable line for a ship-canal to connect the two oceans. His researches in the first expedition were directed towards the line proposed some seventeen years ago by Dr. Cullen between the Gulf of St. Miguel and Caledonia Bay, which had been insufficiently explored by the international expedition sent out about that time. The result of this first journey was to confirm the conclusion arrived at by Mr. Gisborne, namely, that no practicable line exists for an interoceanic canal in this direction. A journey was afterwards undertaken up the River Tuyra, as far as Paya. M. de Puydt thereupon returned to France, and in 1864 he was charged by the French Government to organise another party for the purpose of examining thoroughly the low range of the Andes about 60 miles to the south of the line above mentioned, where the River Tanela discharges itself into the Atlantic, near the northern arms of the River Atrato. The expedition was formed in New Granada, and, after a toilsome exploration of several months, succeeded in discovering a break in the Andes, at the upper course of the River Tanela, which renders possible the formation of the long desired object of a ship-canal between the two oceans. The narrative of M. de Puydt in a condensed form is to the following effect:—

I left France in December, 1864, and proceeded to Carthagena in New Granada, where I organised my expedition, composed of fourteen men. Three of these merit especial mention in consideration of the devotion with which they assisted their leader in carrying out the objects of the expedition: these were M. Ferdinand Mougel, jun., Engineer, and Messrs. Truchon and Decurey, residents of Carthagena, and who, excited by the grandeur of the project, had resolved to share the dangers of the journey.

Before finally leaving for the Isthmus I made a journey to Bogotá, for the purpose of examining all maps and documents existing in the capital that might throw light on the geography of the Isthmus. It was not till the 28th of June, 1865, that we left Carthagena, in an old coasting-vessel of thirty tons' burthen, named the *Esperanza*.

We were obliged to keep close to the shore, and to navigate only during the day, in consequence of the rotten state of the vessel, and the frequent squalls which blew from the south almost every night. In doubling the Point of Caribana, to enter the Gulf of Uraba, we nearly suffered shipwreck on a reef called Lavadera.

On the 7th July we arrived at Pisisi, a little village near the mouth of the Turbo, on the eastern coast of the gulf. Being so near the site of our intended operations, I hoped to be able here to obtain some information about the country which might be useful to us; but it was impossible to learn anything. The inhabitants said the district was inhabited by wild Indians, commanded by a Cacique of savage temper, and hostile to all strangers. They said that none but Indians of the same tribe could enter their rivers or villages without running imminent danger of life. A more important piece of information was that the River Tanela, which I was in search of, had no existence, the name being simply that applied to one of the thirteen mouths of the Atrato. I was, however, so convinced my informants were wrong—having ascertained by old maps that this river existed as an independent stream—that I gave no heed to their warnings. I ordered the pilot of our vessel to obey my orders without a word of opposition, and to follow the route I should point out.

We left Pisisi on the 10th July, crossing over with a good breeze to the mouths of the Atrato, two of which (Boca Grande and Boca Tarena) we passed, and found them so silted up that there was no longer sufficient depth of water to enable the canoes of the Indians to enter them. In the afternoon we cast anchor off the mouth of the Tanela, and, at a distance of two miles from the shore, seen through a glass, the coast appeared like a long hedge of mangroves, sheltered behind a bar of sand, on which the sea broke with great force. To the west rose a chain of hills, terminated on the south by the Peak Tarena, and on the north by the Peak Gandi. A group of islands bounded the view off the coast towards the north.

We proceeded now to disembark to make a preliminary examination of the river, I, M. Mougel, M. Truchon, and four good paddlers in our small boat, all well armed. We passed the bar, happily in safety, and at the bottom of a calm and beautiful little harbour found the mouth of the river, about 22 yards wide, and not visible from seaward. Paddling up the stream we found it near the mouth three fathoms deep, and, six miles upwards, one and a half fathom; but the water was below its mean height. Its direction is generally w.s.w. to a point where there is a confluence of two streams, the more northerly of which descends from the Sierra de Estola, and the more southerly has its source between the buttresses of the Sierra de Mali.

Existing maps erroneously represent the Tanela as having two mouths. It has but one, but the nature of the ground shows that it may have formerly had two or more mouths. The immense sedimentary deposits of the Atrato have gradually filled the whole of the bottom of the Gulf of Uraba, forming level sand-banks, supporting a growth of mangroves, and traversed by numerous channels more or less navigable.

Before penetrating further into the country towards the Cordillera it was necessary to make an extended survey of the river, and especially to ascertain the disposition of the Indians of the village of Tanela, who where reputed hostile to all strangers. The position of the village had also to be ascertained, as it was unknown.

On the 11th July I re-entered the river with a strong party. Beyond the point reached the day before it becomes broader in places, and its bed is encumbered with débris of rocks. A deserted *rancho* or hut was met with, under which were two small boats, and a short distance beyond there was another hut, surrounded with banana-trees, and also deserted.

On the following day, towards evening, we reached the confluence of the two streams before mentioned. From the sea to this point there are no less than seventeen obstructions in the shape of rapids or falls; but all of slight inclination and easy to surmount, either by towing or poling. At the confluence there is a rapid with an inclination of nearly 5 feet, which is a much greater obstacle. In the season of rains these rapids and falls would all disappear with the elevation of the water a few inches above its present level.

Leaving the smaller of the two branches to the left, we ascended the northern stream in search of the Indian village. The Indians of the Tanela are expert navigators, and their canoes, constructed of single trunks of trees, are remarkably well made. Their huts are formed entirely of bamboo and are extremely neat, the roof being covered with palm-leaves artistically woven together. We slept in a hut of this kind on the night of the 12th.

On the evening of the following day we arrived at the village. The inhabitants were all out on the bank of the stream, and as soon as we came in sight a canoe manned by three Indians put off and advanced towards us. One of the men was Nusalileli, Cacique of Tanela; he gave us a most friendly reception, and invited us to rest for the night in his village. We received there the frankest hospitality, but it was impossible to obtain from the Indians the least information about the interior of the country, the paths, or the situation of certain points we wished to know.

We left Tanela on the 14th, the Indians refusing to accept any recompense for the hospitality they had given us. Although we had not succeeded in overcoming their distrust with regard to the objects of our journey, I was convinced that we had nothing to fear on the score of opposition by force to our movements.

My plans were now finally arranged. I resolved to disembark from our large vessel all the *matériel* and provisions, ascend the Tanela as far as the confluence, construct a hut at that point to serve as basis of operations, and commence from there to open a path through the virgin forest, guided by the compass, and pursuing the direction of the southern branch, which would probably lead towards the Pacific slopes by some one or other of the depressions or transverse valleys of the Cordillera.

The execution of this plan was commenced without delay. Unfortunately an accident occurred to delay its progress. One of our canoes, carrying M. Truchon and six men, was capsized in passing the bar, at the moment when a sudden squall compelled me to weigh anchor and remove the larger vessel. Happily no life was lost; but our party became divided for many days. It was not till the 24th that we were enabled to commence operations in the forest of the Tanela. The whole of the expedition, with provisions and tools, were then ashore. I now put in execution a plan I had conceived to prevent the desertion of our ten labourers, who were chiefly half-castes, having great dread of the Indians, and likely to abandon us on the first sight of a conflict with them. I made a signal to the pilot of our vessel to hoist sail and leave us for Pisisi, to return for us in September. Our men were stupified at the spectacle of the departure of the vessel, but they now knew that they had no help for it but to march onward and perform their duties.

The Indians aided us to construct our huts; our relations with them, in fact, were most peaceful. In order to avoid repetition, I may say that this state of things continued up to the end of my exploration.

Five days afterwards we commenced clearing our path. We had scarcely begun when a body of 19 Indians, tattooed and armed, from two other villages, came to visit us, and tried, by all sorts of lying stories, to dissuade us from our enterprise; but finding all their efforts vain to shake my resolution, they left us. A second body of Indians still larger, and headed by their Cacique, came on the 10th, and we could not get rid of them until after a debate which lasted three hours, when they found that all their descriptions of the obstacles that lay in our way were powerless to prevent us going on with our project. During these disputes the work of exploration was not interrupted, except by attacks of fever from which some of us suffered. After eighteen days had thus passed, I made a short excursion out of the path our men had laid open, with a view to ascertain the nature of the upper course of the northern branch of the Tanela. The stream, which I found without much difficulty, was running in a rocky bed and interrupted by falls of three or four feet in height. A storm which swelled its volume so considerably that I was obliged with my two men to spend the night on its banks, convinced me that the river receives the waters of the rains which fall on the broad plateaux of the salient ridges of the Sierra de Estola, where it takes its rise. The southern branch does not rise in the mountains, as is proved by the fact that a heavy rain of fourteen hours' continuance did not perceptibly affect its volume.

During the two following days I tracked the course of the southern branch as far as the foot of the slopes of the Mali Mountain. I was able myself to see, on mounting an elevation, through the opening in the forest caused by the river, the two summits of Mali and Estola sloping abruptly and leaving between them a breach in the form of a V, beyond which nothing was visible to the western horizon. During many days' wading through water and swamps I succeeded in examining all the undulations of the district, and I was convinced that the object so long desired—the discovery of a break in the Cordillera of the Isthmus—was within my reach.

After observing with accuracy the bearings of the path we had opened through the forest, I departed on 25th August with M. Decurey and five of our best men, loaded with our hammocks and provisions for five days. M. Truchon remained in command of the party, with the instructions that if I did not return by the end of the month he was to proceed without me to the sea-coast.

We on our parts committed ourselves to the task of penetrating the forest towards the west, perhaps to perish, perhaps to discover a path to the shores of the Pacific.

We pursued our course towards the ridge of Mali. On the night of the 26th we slept at the foot of the range, and on the morning of the 27th ascended the mountain at an altitude of about 1300 feet above the plain. On the side of the Pacific the slope was almost perpendicular, and a splendid view was obtained of the limitless wooded plain, through which flows the Tuyra and its affluents. From this sea of verdure emerge the peaks of the chain which limits the course of the Chucunaque, and which extends towards the N.N.W., fading away in the blue distance.

It was clear that we had here attained the most westerly limit, in this district, of the chain of mountains which separates the Atlantic from the Pacific slope. It remained now to ascertain whether, at the foot of this same Peak of Mali, the waters of the Tanela were still to be found with the same slope and current.

By the help of our hands, or gliding down on all fours, we made rapid way through the dense masses of ferns and underwood in our perilous descent to the foot of the Peak. I here found, as I had expected, the river, much diminished in volume, and running in a zigzag course between the slopes of the two mountains. It ran alternately west and south, thus giving a general direction to the passage through the Cordillera of S.W. I continued walking in this latter direction with M. Decurey, sometimes wading through the water, at others climbing along the face of the slope, until at length we arrived at the end, where the same spectacle opened to our view as that which we had beheld from the summit of Mali. The prospect towards the west was boundless; the great plains of Darien stretched away to the horizon without any obstacle intervening to intercept the view. The Tanela had become a mere rivulet, fed by threads of water which descended the slopes on both sides, and hidden with shrubs and fragments of rocks.

It was clear we were here on the culminating point—the watershed of the Atlantic and Pacific, where the Nique chain of mountains was depressed to its lowest elevation.

In returning to our encampment I traced downward the course of the Tanela in order to make doubly sure that we had not wandered away from the desired line by the *détours* made in climbing the Mali. In the evening of the 28th of August we rejoined our friends, and celebrated the successful result of our difficult enterprise and the discovery of what had been deemed impossible by so many even among those who were most competent to judge. On the 3rd of September we made sail for Carthagena.

It is necessary here to state that, in descending the Tanela, I made a series of observations on the rapidity of the current of the stream, at all the points of its course. These observations, which I am aware do not lead to a positive result regarding the facility of making a ship-canal across the Isthmus, and which can only be accepted as a temporary substitute for a proper series of levellings, have been submitted to an engineer for calculation. The height of the watershed between the two oceans, resulting from the slope of the Tanela as shown by its current, was found to be little more than 100 English feet (30·79 mètres), and the length of the line having this altitude is only 5 miles. Allowing for deficiencies in the data furnished, we may calculate the maximum altitude of this lowest depression in the Cordillera at about 140 feet. As to the employment of a barometer for measuring low elevations in tropical countries, it is well known to be of very little use, and more accurate results than those here given cannot be expected, unless a set of levels by competent engineers be undertaken. The humidity of the climate, the strong electric tension, the abrupt variations of atmospheric pressure, and the want of tables for correction of error special to these regions, would have rendered the results of barometrical observations very doubtful.

Having concluded his narrative, M. de Puydt enters into various details concerning the geography, climate, ethnology, and natural productions of the Isthmus of Darien. He remarks that the best maps are very incomplete as regards the number, position, and course of the numerous rivers, and he enumerates the affluents of the Tuyra, the great stream which discharges itself into the Gulf of St. Miguel on the Pacific side, and which will form portion of the ship-canal which he advocates along the line he has explored.

The Cordillera of the Andes along the Isthmus, he says, is quite erroneously represented on all maps. The mountains, according to his observations, form three parallel chains; of these the most westerly and highest is the Sierra de Estola, which forms a continuous ridge, except at the source of the Tanela, where it is abruptly depressed as he had described. To the south of the gap it takes the name of Sierra de Mali. The second chain, commencing at Cape Tiburon, follows the sea-coast, forming in some places precipices facing the sea. It is traversed by numerous narrow valleys, through which streams flow, and terminates abruptly at Peak Tarena at the mouth of the Tanela. The third chain, south of Cape Tiburon, forms a line of precipitous islands parallel to the coast.

The Gulf of Uraba into which the eastern or Atlantic end of the future ship-canal will open, has, throughout, to within two miles of the eastern side, a minimum depth of 10 fathoms. The climate of the Isthmus is generally healthy; the depressions in the Cordillera and the numerous streams of water producing a free circulation of aërial currents between the two oceans and dissipating miasma. The seasons of the two coasts, however, do not exactly coincide, and M. de Puydt gives further details on this portion of his subject. The low lands near the coast, and particularly those formed by muddy deposits, are the only unhealthy places, and the vast multitudes of mosquitos render them almost uninhabitable.

The paper will be published, with the author's map, in the 'Journal,' vol. xxxviii.

The PRESIDENT said M. de Puydt had given them a very well-written and attractive description of a country which was very little known to geographers. This gentleman was not known to him personally; but the merits of his work had been brought before him by Mr. Archibald Peel. A map of the exploration had been given by the author, and he (the President) had felt it his duty to call the attention of geographers to several features in it which were new. When M. de Puydt ascended the Tuyra from the Pacific, he ascertained the whole character of the flat and undulating region which lay to the west of the great Estola chain of the Andes, and was convinced there was to be found in that direction a depression in the range. Fitting out a small vessel at Carthagena, in his subsequent expedition, he determined, in the first place, that the little River Tanela was not, as the natives told him, one of the mouths of the Atrato River, but was an entirely independent stream, having its source to the west in the chain of mountains which he had previously described. After having ascended two branches of the river, and found that the southern branch was the one which led most distinctly from the mountains, he discovered that it flowed through a pass, or gap in the range, and by calculating the velocity of the current and rapids, he had determined that this gap between the mountains of Estola and Mali was not more than from 117 feet to 132 feet above the level of the sea. If this calculation had been verified by a series of correct observations, it would be a most important discovery with respect to the chain of the Andes. He told us that the hills near the depression were 400 mètres and 500 mètres in elevation; but he did not tell us that he himself ascertained the altitude of the mountains, or that the altitude was fixed by any accurate observations. At the same time, if these were approximations to the truth, the gallant manner in which M. de Puydt had carried out his expedition, under great difficulties and with very small resources, was certainly deserving the approbation of all geographers. It was not to be imagined, if any canal was to be established between the Atlantic and the Pacific, that the port upon the eastern side would be at the mouth of the little River Tanela: this would be impracticable, on account of the bar; therefore it was probable that the port of Escondido, a little to the north, would be the port from which the canal would have to be made. The question of crossing the Isthmus had been discussed by the Society on former occasions, and had excited the attention of geographers, civil engineers, and the world at large. But this was an account of an entirely new exploration which had been brought before them, and he begged to return the thanks of the Society to M. de Puydt for his communication.

Mr. G. W. HEMANS, C.E., said, as a civil engineer, he had listened with great interest to the paper which communicated the supposed discovery of what had been sought after for many years, more particularly by the expedition conducted by the late Mr. Lionel Gisborne—a great depression in the Andes of the Darien Isthmus; the data, however, which had been obtained by that exploration were, in his opinion, hardly commensurate with the expenses of such an expedition. He could not agree with the author of this paper in his idea that any measurement of heights could be determined by the velocity of water flowing from them; he did not believe that the most careful observations on the velocity of seventeen rapids could enable him to arrive at anything like a true measurement of the height of the pass. Considering the position of that range of mountains, and its elevated appearance so near to the Isthmus of Darien, it appeared to him unlikely that any depression would be found so low as 30 or 40 mètres. It was to be regretted that an explorer of so much activity and energy should not have taken the trouble of carrying with him even a pocket aneroid, which, without the trouble of barometers, would have given something like a scientific approximation to the real height of the pass.

Captain BEDFORD PIM quite agreed with what had fallen from Mr. Hemans with reference to the mode in which the height of the pass had been obtained by the explorer. It was not his intention to enter into any criticism upon the exploration, because there was a practical difficulty in carrying out the canal scheme across that part of the Isthmus of Darien, which he thought was insurmountable. By the Panama Railway concession, which had just been passed, dated the 16th of August, 1867, reforming the contract of April 15th, 1850, the Government of New Granada had bound itself not to construct, or to concede to any person or company the right to construct, a railway or an oceanic canal in the territory to the westward of a line drawn from Point Escoces on the Atlantic to Point Garachine on the Pacific, which would include the Pacific terminus of M. de Puydt. So that, without the permission of the Panama Railway Company, it was impossible for any one to make a canal, even supposing it was a dead level from one ocean to the other. He understood from the paper that a company had been formed in Paris to make this canal. It seemed to him most important, and it was a duty, on his part, to point out this difficulty. Then, again, there were difficulties in respect to the "physical geography of the sea" on the Pacific side, which had more than once been pointed out by Captain Maury himself, and which seemed to be too little considered in all transit schemes. To revert to M. de Puydt's loose way of ascertaining the height of the country by the velocity of the rapids, he could give an example in his own experience of exploration in Nicaragua to show its fallacy. At San Carlos, the point where the Lake of Nicaragua flows into the River San Juan, and which is 130 feet above the ocean, the current is very sluggish; in fact, so much so, that it is called "Aqua Muerta," or dead water; while half-way down the river, where the current was at least four miles an hour, the elevation was only 80 feet above the sea. But, according to M. de Puydt, the elevations ought to have been exactly the reverse.

The PRESIDENT said the author of the paper did not tell us that he took either aneroids or other instruments with him; and of course his heights could not be relied upon. But he must say the paper was calculated to excite public interest in the region explored, and to create a desire for proper survey of this region.

2.—*Notes on the Physical Geography of the Belize River.*

By S. COCKBURN, Esq.

[Extracts.]

As one of the Commissioners in the late expedition up the River Belize, it struck me that I might take the opportunity to make, in passing, some observations on the physical aspect of the localities we had to visit, which, though not the immediate object of the Mission, might still, I thought, prove not altogether devoid of interest. Unfortunately I took with me no instruments save a portable aneroid barometer, which, however, behaved very well, and enabled me to arrive at conclusions with tolerable accuracy, though the whole perhaps would require verification; for, in the absence of any statistics on the subject, I had solely my own observations to rely upon: the deductions therefore are the very best approximations possible, and can only serve as a basis of comparison on any future explorations.

The maps of the country are very incorrect, but on careful admeasurements of several Spanish maps of Guatemala, &c., I make the watershed of the river 90 miles by 30, equal to 2700 square miles, and, allowing 100 inches of rain to fall over that area annually (by no means too much, for it often rains in the interior, the mountains and forests attracting the clouds, when not a drop falls here, and the average rainfall in Belize for the last four years is 67½ inches), it will give no less than 39,128,161,745 gallons, equal to 17,467,929 tons.

I find the length of the river from Belize to the fork at the "Branch," allowing for sinuosities, to be 150 miles; the two branches to their imaginary source, estimated at 30 miles; the creeks, many of which are now dry, 220 miles. Then at "Orange Walk" it is 187 feet wide, and 3, 6, 9, 6, 3 feet deep at different parts across. At "Young Girl" it is 180 feet wide, and 6, 10, 6 deep. Higher up, at the "Branch," it is 100 feet broad, and 3 and 6 deep; and lower down it is 200 feet by 8, while at the "Haulover" it is 600 by 10, and from the new road across it is 420 by 12, and at the Belize Bridge it is 121 feet from side to side, by 8, 11, 6 deep. Besides these there are some pools and basins 20 and 25 feet deep. Taking the mean of all these measurements (allowing only

100 miles × 10 × 12 feet for the *present* state of the tributaries with their lagoons) we have 2,007,073,600 cubic feet, equal to 12,500,289 gallons, or 55,840 tons of water *at present* in the river; deduct this from the rainfall, leaves 17,412,089 tons for the discharge and evaporation per year.

I estimate by experiments at the Belize Bridge and the Haulover that the river discharges into the sea by these two mouths about 5,413,680 tons per year, equal to 2276 gallons per minute; which deducted from the figures last quoted, leaves the large quantity of 11,998,409 tons due to evaporation. This is not improbable, since the discharge of some of the largest rivers is comparatively small in proportion to the rainfall, the greater part going off by evaporation, especially in tropical climes. The area of the Mississippi valley, for instance, is said to embrace 982,000 square miles, and the annual average rainfall equal to 40 inches, while the river discharges only about 107 cubic miles annually into the sea, equal to about one-sixth of all the rain that falls upon its watershed, leaving 513 cubic miles of water to be evaporated from this river-basin annually. Still other measurements should be taken during freshets and at the floods to verify my calculations. Indeed a series of continuous observations should be spread over a whole year in order to arrive at a correct estimate of the total annual discharge into the sea. But as I noted the marks left by the high water in different places on the banks, and on trees by the margin of the river, I have used them as a rough guide in the mean time.

The water at the floods rises in some places 25 and 35 feet in the main river, and in the creeks 10 and 20; and, though there are ridges intervening, the lands on the northern part of this hydrographic basin is much lower than the river: they must therefore be under water in the rainy season, and the strong current of the main river must push back the waters of many of the creeks, overflow the lagoons and inundate the whole country round. This must have happened even to Belize before the Haulover mouth was opened, for it appears to me that formerly the river discharged itself only by the embouchure at the Belize Bridge, where it must often, on a "top-gallant flood," have spread itself over large areas in the immediate vicinity, till the force of the current opened another mouth for itself at the estuary of the Haulover, and thus the delta was formed. Those lands are slowly rising, as much from the detritus brought down by the river as from the influence of gentle internal forces; and in the course of time even the lagoons will silt up and become dry, so that in *after ages* the whole will become a rich "bottom," covered with alluvial deposits of the most productive kind, in the same manner as the present ridges were before they were elevated to their present height.

The banks on either side rise gradually as you go up, and the limestone formation crops out here and there, embedded in a concretion of coarse calcareous grit, with iron oxide, with thick layers of marl, loam, and clay, overtopped by the silt and detritus brought down and deposited by the river. The limestone thins out at the "Branch," where foliated slate appears, with joints and cleavage distinctly marked, rendering it well fitted for economical purposes. In some places the clay is mottled and variegated like Spanish soap, and in others (as at "Red Bank") it assumes a dark-red colour, from the abundance of ferruginous oxide. At "Hogstye," between "Red Bank" and "Orange Walk," a large block of pure gypsum crops out, and at "Duck Run" large boulders of indurated calcareous marl appear in the bed of the river.

There are some other rocks lower down at the rapids; and though, in the dry, the incline is very great and the current rapid, the channel being very narrow, and boats sometimes get upset in passing, yet there is no actual danger which care and caution will not overcome. There is nothing like a cataract or waterfall strictly so called, and I have no doubt that, by blasting the rocks and removing other impediments, a proper steamer might navigate as far as the "Branch" for at least six months in the year. At present the river is fordable in several places, and it sinks at the rate of six inches in the twenty-four hours; but one day it rose twelve inches, in consequence of rain having fallen in the interior the day before. It is heavy and brackish even up to "Bakers," where the tide I believe reaches, but improves as you go higher up; still, even at "Young Girl," though drinkable, it is copiously impregnated with lime. The temperature at any hour, night or day, is always higher than that of the air. I had no detached thermometer to test it by, but to the touch and feeling it always had a sensible degree of warmth.

The whole extent of the lands we traversed is covered with dense forests of timber (dicotyledons, coniferæ, &c.) and thick tangled underwood, vines, and jungle, in the wildest tropical luxuriance. The land is undulating, and rises in a gentle slope up to the base of the Blue Mountains of Guatemala.

The formation is undoubtedly of limestone of the tertiary period, but of a soft, coarse, and impure description. In fact, it is more a sort of calcareous breccia mixed with iron oxide, not unlike the *Calcaire Grossier* of the Paris basin, only that it contains no comminuted shells, and so *very recent*—nay modern, geologically speaking, as hardly to have yet acquired a consistency beyond indurated calcareous marl. This applies especially to the portions projecting through the alluvium in the ridges, where they are granular and friable. Fragments of fossil shell (volutæ), with their casts, I dug up on the ridge at "Young Girl." Their analogues are to be found in existing species in the neighbouring sea, thus proving how very recent the formation is. To me it seems even posterior to the *pleistocene* of the tertiary.

Belize, 30th June, 1867.

The PRESIDENT said that some of the observations contained in this account of the basin of the river Belize were of geological interest, as they related to the amount of mud and clay brought down by the river, and the gradual elevation of the coast. The statistics of the volume of water which the author had given were also worthy of notice. Respecting the river Belize, Admiral Collinson had informed him that Lieutenant Cooper Abbs, R.N., of the *Doris* frigate, had recently explored a great part of the district, and had sent home a report of his investigations with a detailed map. He was happy to announce that the valuable geographical observations contained in this report were being extracted by Admiral Collinson, and that a memoir would shortly be laid before the Society.

Fifth Meeting, January 27th, 1868.

ADMIRAL SIR GEORGE BACK, D.C.L., F.R.S., VICE-PRESIDENT, in the Chair.

ELECTIONS.—*Joseph Anderson, Esq.; John Anderson, Esq.; G. F. Angas, Esq.; Capt. H. Barber; W. E. Blair, Esq.; Richard Davis, Esq.; Capt. F. J. A. Dunn; C. F. Ellis, Esq.*, Lieut. R.A.; *William Falconer, Esq.; A. Fyfe, Esq.*, M.D.; *A. Gilliat, Esq.; J. Percival Hunt, Esq.*, M.D.; *Richard Jamieson, Esq.; A. Laybourne, Esq.; Henry Murray, Esq.; F. M'Clean, Esq.; B. Newbatt, Esq.*, M.A., &c.; *D. Phillips, Esq.; Trevor Plowden, Esq.; Charles S. Price, Esq.; H. C. Rass-Johnson, Esq.; Capt. G. E. Shelley; Alexander W. T. G. Thorold, Esq.; W. Walkinshaw, Esq.; F. M. Williams, Esq.*, M.P.

ACCESSIONS TO THE LIBRARY from JANUARY 13TH to 27TH 1868:—'The Treasury of Geography: Physical, Historical, Descriptive, and Political,' &c., by W. Hughes, F.R.G.S., 1867. 'The Geography of British History; a Geographical description of the British Islands,' &c., by W. Hughes, 1866. 'A Manual of Geography, Physical, Industrial, and Political,' by W. Hughes, F.R.G.S., 1867. The latest editions of W. Hughes' Geographical Works, presented by the Author. 'The Chinese Miscellany, designed to illustrate the Government Philosophy, &c., of China,' Shanghae, 1849.

'Origin of the Chinese,' Chalmers, 1867. 'Journal of the North China branch of the R.A.S.' 'The Chinese Repository,' in 19 vols. Vol. i. wanting; vol. ii. incomplete, wanting 2, 3, 4; vol. iii., parts 5, 6, and 8; vol. iv. parts 3, 4, 5, 6; vol. v. 6 and 7 wanted; vol. viii. complete; vol. ix. 1, 2, 4; vol. x. 2 and 8; vol. xi. wanting; vol. xii. part 1; vol. xiii. part 10; vol. xiv. 1 to 9; vol. xv. parts 2, 9, 10; vol. xvi. perfect; vol. xvii. 4, 6, 7, 8; vol. xix. 1, 3, 4, 8; vol. xx. wanting part 4. 'Notes for Tourists in the Northern part of China,' Hongkong, 1866. All the above presented by Mr. Trübner. 'Journey of the Shanghai Literary and Scientific Society,' 1858. An English edition of Du Halde's 'Empire of China, 1741.' Two vols. fol., wanting the maps. Purchased. 'The World Surveyed; or, the Famous Voyages and Travailes of Vincent le Blanc of Marseilles,' &c., 1660. Purchased. 'Inventaire et Classement raisonné des Monuments de la Géographie publiés par M. Jomard de 1842 à 1862.' Communication de M. d'Avezac. 'The Imperial Gazetteer and Atlas of England and Wales.' Presented by A. Fullarton & Co.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING, JAN. 13TH, 1868.—Map of London showing proposed Railways and Improvements for the year 1868, by E. Stanford. Presented by the Author. French Charts (302 in number). Presented by the Depôt de la Marine. Admiralty Chart of Santorin Island. Presented by the Hydrographic Office. Three Tracings and Three Views of Herald Island, Arctic Regions, by Capt. H. Kellett. Presented by Admiral Collinson. Chart of the Sandwich Islands, by the United States' Exploring Expedition, 1844. Presented by A. Waddington, Esq. Map of the City of Victoria, Vancouver Island, by A. Waddington, Esq. Presented by the Author. Plan of the City of Antananarivo, Madagascar, by J. Sibree, Esq. Presented by the Author. Admiralty Charts (19 in number) up to date of publication. The Hydrographic Office.

The CHAIRMAN said, before entering on the subject of the evening, he had much regret in informing the meeting that Sir Roderick Murchison, their excellent President, was confined at home by, he trusted, only a temporary illness. Much might they regret his absence on the present important occasion, from his knowledge and experience, and the great interest he had ever taken in African discovery. To his instinctive sagacity the English public are indebted for the detection of the falsehood of Moosa and the Johanna men, while his great affection for Dr. Livingstone induced him to request the Council of the Geographical Society to press upon Government the desirableness of fitting out an expedition to set all doubts at rest. The proposition of the Council, as we all know, was nobly responded to, and the expedition has now returned completely successful. He felt it necessary to say a few words in commendation of the honesty, resolution, and ability, of Mr. Young, the leader of the search-party. Having been a member of the committee for organising the expedition, he had an opportunity of witnessing and approving the choice of Mr. Young. Mr. Young, who knew the Johanna men well, was convinced of the untruth of their story, and with characteristic intrepidity he said he would go and detect the falsehood. He was questioned on various points by the Committee, with respect to his knowledge of the route to be taken, and to none did he answer with the slightest hesitation. He calculated his daily journeys as to time and distance, from the mouth of the Zambesi to Lake Nyassa; and by the quickness of his movements he had performed the journey within the time specified. Mr. Young arrived at the mouth of the Zambesi on the 27th of July. No sooner had he entered the Zambesi than he heard that the Landeen Caffres had destroyed the whole of the Portuguese establishments on the southern shores of the river, from Senna to Tette. On arriving at Senna he also learned that the Mazite Zulus had made a predator yexcursion from the north-west of the Nyassa Lake, round its northern extremity, due south or nearly so, to the very banks of the Shiré; thus threatening to cut off his communication with the Makololo at the foot of the rapids. It required no small courage and tact to persevere in the face of such dangers; but he pushed on, arrived successfully at the foot of the rapids, and, with the assistance of some men, it took him only four days to surmount the rapids and gain the southern part of the lake. Pushing on from thence against a gale of wind, in which the steel boat was nearly swamped, he ultimately arrived at a bay where he had the happiness to gain information of Livingstone, not only from negroes who had seen him, but from the Arab merchants, who informed him that Livingstone proceeded to the south end of the lake, had there crossed over, and was going forwards on his journey. Much further information was obtained at Marenga on the south-western side of the lake. This information was so convincing, that Mr. Young considered the object of his journey was in some measure answered. From the chief Marenga he learned that he had sent fifty to eighty men with Livingstone to carry on his goods towards Tanganyika; and he told him that if any accident had happened to Livingstone within a month's journey he should have heard of it. Mr. Young returned to the mouth of the Zambesi, and arrived there on the 11th of November.

The SECRETARY then read the following letter from Sir Roderick Murchison:—

"MY DEAR SIR GEORGE,

"Alas! the day when I most wished to preside over the Geographers, and when I hoped they would have given me their hearty thanks for the part I have taken in organising the Livingstone Search-Expedition, must now pass away without my daring to appear before them, on account of a rheumatic and febrile attack which compels me to stay at home.

"The document which I drew up, approving in unqualified terms of the conduct of Mr. Young, and which was unanimously approved by the Council, will be read to the meeting, and will prove to the whole assembly how much we value the services of that excellent man.

"I ask you to take the Chair for me at the Evening Meeting, and to state that inexorable fate prevents me, to my great vexation, from attending.

"You who know as well as any member of the Council how I have strenuously pulled the leading oar in bringing about this Boat-search Expedition, how I sought out Mr. Young, and how I prevailed upon the Secretary for Foreign Affairs and the Board of Admiralty to approve the design, can well understand the glow of honest satisfaction I felt when I heard of its complete success.

"Again you also can testify to the firmness with which from the first day of the reports of the murder of my dear friend Livingstone I resisted the almost general belief; for without that resistance no Government and no Board of Admiralty would have countenanced an expenditure of money, even in search of so great a traveller and so good a man as Livingstone.

"In taking this line and in pursuing it with ardour I was well aware I undertook a heavy responsibility; but as my distinguished friend, Captain Richards, R.N., the Hydrographer, embraced the cause with equal zeal, and the Lords of the Admiralty most generously supported it, nothing remained but to pray for a successful issue, and have full confidence in Mr. Young. Our project, thanks to that excellent seaman and his companions, has been entirely successful.

"But often has my energy almost broken down when I reflected on the various difficulties to be overcome! For I well knew how many casualties might occur to prevent the expedition ever reaching the spot where, as it is now proved, the Johanna men deserted him.

"My friends of the Geographical Society will recollect that from the first I expressed my belief that the Johanna men had *deserted* Livingstone, and had concocted a false and wholly incredible account of his death.* I subsequently † gave as an hypothesis of their reason for deserting that they were coast-men, and acquainted only with the Zambesi and its tributaries, and that when their chief decided on plunging into the heart of Africa, they fled from him; and, indeed, they assigned as their motive to the native chiefs, to whom they told the truth, that it was fear which prevailed over them. Had they only re-told this story to the Consul at Zanzibar, what sufferings of the friends of Livingstone would they not have averted, instead of bringing on themselves the execrations of everyone! I hope some measures will be taken to make these wretches feel that, in reporting to British authorities, they must speak the truth.

"To put together a boat constructed in sections, to find a negro crew for the navigation of the Zambesi, to take the boat to pieces, and have it carried up 36 miles along the sides of the Cataracts to the River Shiré; then, after navigating the waters until the fate of Livingstone was clearly ascertained, to convey her back to the Zambesi, and finally bring her and the party safe back to England without the loss of a single man; this, indeed, is a real triumph.

"Now, indeed, we have only to rejoice, and, in the fullest confidence that the white man seen on the west shore of the Lake Tanganyika was Livingstone, I look with the deepest interest to the arrival on the east coast of the Arab to whom Livingstone entrusted letters from the Consulate at Zanzibar. When these letters arrive we shall know whether the great traveller has followed some large river to the west coast, or has crossed eastwards to Zanzibar; or whether, indeed, he may not have it in view to work northwards into the vast tributaries of the Nile.

"In regard to these three hypotheses I may add that Dr. Kirk at Zanzibar, in a letter dated 30th November, which I have not communicated to the Society, states that, though anxious to come home himself, he says, 'But I will not stir until I see our dear friend safe out of Africa.' Hence I infer that Dr. Kirk thinks that, having once determined the problem of the waterflow of Lake Tanganyika, Livingstone will cross over to the east coast.

"It is a source of deep vexation to me not to be present on this occasion, when I should have had it in my power to express personally the great obligation we owe to the Board of Admiralty; and I am sure that the Society will unanimously return thanks to their Lordships for their truly liberal and judicious support of the expedition as recommended by our Council."

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* *See* 'Proceedings,' March 11th, 1867.

† 'Proceedings,' vol. xii. p. 23.

The SECRETARY then read Mr. Young's Report:—

To Sir Roderick Murchison, Bart., K.C.B., &c.

SIR,—I have the honour to lay before you a brief outline of the proceedings of the Expedition under my command, sent out to Africa by the Royal Geographical Society for the purpose of ascertaining the truth or falsehood of the reported death of Dr. Livingstone. I am happy to inform you that our efforts have been crowned with success, and I have satisfactory evidence that Dr. Livingstone was not murdered by the Mizitu, nor by any other tribe, at the place named by the Johanna men, but had gone on in safety far beyond. I have also satisfactory evidence that the Johanna men deserted shortly after leaving Marenga, returning by the same route as they had gone.

But I must first begin the narrative from the time of our landing at the mouth of the Zambesi. Immediately on landing I succeeded in getting a negro crew to take the boats up as far as Shupanga, where I arrived on the 2nd of August. I at once engaged a fresh crew to go on to Chibisa, and the next day started for Senna. Arrived there on the 6th; found the Portuguese authorities very obliging; made what arrangements were thought necessary, and proceeded on the next day. I learned from the Portuguese that the Mizitu were in full force on the Shiré, and were threatening Chibisa, so I arranged with the authorities at Senna to send on to me at Chibisa (should I require them) 100 men, fearing, as the Mizitu were there, I should not be able to get the Makololo to accompany me.

We arrived at Chibisa on the 17th, and found that the reports about the Mizitu having been there were quite true, and that they had been down in force to the left bank, robbing and burning the houses, murdering some of the people they caught, and taking others prisoners. The Makololo put off in canoes from the opposite bank and shot three of them. Of course I was quite unprepared to meet the Mizitu in this part of the country.

The Makololo, as well as the people who were of the old mission party, received us gladly. I requested the Makololo to attend the next morning, which they did, when I acquainted them with the object of my mission. They agreed to accompany me on certain conditions, which I agreed to. One was that I should leave some ammunition behind with those that remained, so that should the Mizitu attempt to cross the river below the Cataracts they would be well able to encounter them. After arrangements had been completed, we started on the 19th for the Cataracts; arrived the same day, and at once began taking the boat to pieces. Hitherto all had gone on well, but no sooner had we got the boat to pieces, and everything was ready for the journey overland, than fresh reports about the Mizitu reached the Makololo, which very much daunted them, and had also a tendency to lower our spirits, for without their help we could do nothing, as it was not only their help that we required, but also that of their people, they being the chiefs of the country round about. After a good deal of persuasion the whole affair was settled to our satisfaction, and on the evening of the 23rd the Makololo appeared in force with about 150 men.

We started next morning with the boat, provisions, luggage, &c., making in all 180 loads. The men worked well, and we arrived with everything in good order at Pomfunda, above the Cataracts, in four and a half days. The heat during the journey was excessive, even for Africa. We at once commenced rebuilding the boat, and everything appeared to be going on well when fresh reports reached us about the Mizitu. We were visited by some of the Ajawa chiefs who had been driven out of their own country, and were obliged to cross the river to save themselves from being murdered. There was an encampment, close by the place where we were building the boat, of about 200 Ajawa, the sole survivors of the once powerful people under the chief Joey.

Every day fresh reports reached us, and the Makololo wanted to return home, which of course I could not consent to. At this place we first heard from a native of a white man having passed through Maponda at the south end of Lake Nyassa. He stated that he had seen him, and gave a description of his dress, &c.

Launched the boat on the 30th, and started up the river next morning. The Makololo not working well, and making every excuse, not being well, &c., thinking perhaps we would turn back. They stated that the risk was too great, that there was little chance of our ever returning, but as they had gone so far they would go on and die with us; of course all was agreed to. As we proceeded on we found vast numbers of Ajawas and Machinkas on the left bank, living in temporary huts, who had retreated before the overwhelming numbers of Mizitu. Reached the small lake Pamalombe on the evening of the 5th of September.

During our passage up the river heard several reports that a white man a twelvemonth before had stopped at Maponda for some time, having crossed from the opposite side, and that after resting there some time he had gone on in a westerly direction. I now felt almost convinced that it must have been Livingstone, but I almost feared to stop there, for I felt certain had the Makololo been satisfied that it was him they would have gone no further; for my agreement with them was, that as soon as we had satisfactory evidence that the Doctor had gone on in safety, or that he had been killed in the way described by the Johanna men, I would return with them immediately. But now, as it appeared that he had passed over the south end of Nyassa instead of the north, I wanted to find out where he had first struck the lake. The Makololo stated that they were certain that if a white man had been killed, or had died within a month's journey of where we were, we should certainly have heard of it before we got thus far.

The next morning crossed the Pamalombe, but could not find a passage in to Maponda, owing to the quantity of rushes and grass, and it blowing very hard at the time we made for the river. Here again we met great numbers of natives, who appeared very hostile. They lined the banks with their guns, and demanded that we should come into them. The Makololo appeared very much afraid, so I laid the boat to, to await the approach of two armed canoes that had shoved off from the shore. I soon made matters right with them, and shortly afterwards entered Lake Nyassa, and slept the first night on the Rock Boasuam.

Started the next morning with a fine breeze for the east side of the lake, steering as near as possible for the Arab crossing-place, as laid down by Livingstone. We had not run more than two hours before a heavy gale began to blow, and for three hours we had to run along the coast to try and find shelter, but the rocks and breakers met us at every hand. This proved the finishing stroke to the Makololos' courage, who all laid down at the bottom of the boat to die, and although the boat was constantly shipping heavy seas, they refused to bale out the water. The steel boat behaved well, but was far too deep for the stormy Lake Nyassa. At length, after three hours' weary watching, we succeeded in finding a sheltered spot where we stopped to dry our clothes. Only one native appeared at this place, who when he saw us first was much frightened; but as soon as we stated we were English he willingly came towards us. He told us an Englishman had passed through his village a year ago, and that he had come from the Arab settlement, and had gone south to Maponda. Started again for the former place, but found the distance too great to reach before dark; put into a small sandy bay, where we found some natives fishing.

I must here remark that at any place, on first visiting it, no one was allowed by me to get out of the boat, except myself, Mr. Faulkner, and the interpreter. I soon got into conversation with these men, when they spoke of a white man who had been there, without being asked. They stated that he had first made that place coming from Makata, had stopped nine or ten days to rest, and then went north to the Arab settlement to try and get them to carry him and his party across the lake, but after waiting there some time he returned, making his way south for Makata. They described his dress, what luggage he had, imitated him taking sights, and sleeping under a mosquito curtain, and stated that he had a dog with him named Chetane. They said the head-man of the carriers was named Moosa; two of the boys spoke the Ajawa and Mananja language, and were named Juma and Wako. They told us what barter goods he traded with; on being shown an album with numbers of likenesses, they at once recognised the one of Livingstone. That there were nine of Moosa's countrymen with him, who did not speak either the Ajawa or Mananja language. He did not buy slaves or ivory; he had come to see the country. Besides numerous other things that left no doubt on my mind that it was Livingstone.

Next day we arrived at the Arab settlement, where we were received kindly, and found all that I had heard before was quite correct. Livingstone waited at this place nine or ten days for the Arab boat, which did not arrive, so he started south again, and they traced him as far as Maponda. I visited the house Livingstone lived in during his stay, and I purchased a few articles (all English make) that he had traded with, such as small round looking-glasses, a knife, razor, iron spoons, &c. Of course most of the calicoes, &c., were already worn out, but the chief still possessed an Indian manufactured scarf that Livingstone had presented to him on leaving. I sent two of the most trustworthy Makololo with my ever faithful interpreter (whom I brought from the Cape) on the road to Makata to see if that was the road he had come, while we again went south, making short marches inland, to try and find the route the Johanna men took in going back, as they had not visited this place or the last. We obtained other trifling articles in the shape of barter goods, and while waiting for the return of the Makololo obtained from a chief further south an English Common Prayer Book, which he stated had been left behind by the Englishman in the house he had slept at.

On the 13th the searching party returned, having gone two days' march on the road to Makata. Livingstone had come that way. They brought back some glasses, fish-hooks, &c., that he had traded with. They would have gone further, but were ill-treated by some of the natives and driven back: their reason for so doing, they said, was that the Englishman had brought fighting into the country, for the Mizitu had been killing their people ever since he left.

Sept. 14*th.*—Started for the opposite side of the lake, made for Chinsamba's. Although we started with little or no wind, it again blew a gale before we reached the opposite shore. We found that Chinsamba had been killed some time since, and nothing remained of his village. Skeletons now met our eyes in great numbers, whenever we landed along this side. Saw several natives the first day, both Ajawas and Mananja; and those who had not seen the white man further south had heard of him, but not in a single instance was he spoken of as being dead. I wished to learn, by coming over this side, in what direction he had gone after leaving Maponda. We had not crossed long when we saw a man who had helped to carry the Englishman's luggage for two days; he described him as before. This man had been living inland some distance, but had been driven out by the Ajawa. He pointed in a north-westerly direction, and stated it was five days' journey off, which, of course, would be very much more from Marenga.

Our progress south was slow, owing to the heavy gales of wind. On our way we met several who had seen the Englishman, and more than one had helped to carry his luggage from village to village, and there was not in all their reports the slightest variation. They were not all from the same place, but they all maintained that he had gone on in a north-westerly direction towards the Loangwa. These natives were full of complaints about their neighbours, and would only have been too ready to inform against each other if Livingstone had come to an untimely end at either of their hands, and they all maintained that the Mizitu had never been in that part of the country.

Sept. 19*th.*—Reached Marenga. Seeing the boat approach the shore they lined the beach with their guns, &c.; but, as soon as we told them we were English, they laid their arms down and welcomed us. I at once asked to see Marenga, when I was conducted up to his house by one of his wives. Marenga rushed towards me, and, seizing me by the hand, shook it heartily, saying, "Where have you come from, and where is your brother that was here last year?" and as soon as I told him I had come to follow him, he began and told me all he knew of him. He said he had come there from Maponda, had stopped there two days; he was very kind to kim, making him presents, &c., and he in return gave him what food he required. Livingstone gave him medicine, which was done up in doses; the papers he used formed part of a 'Nautical Almanack' for the year 1866. He lent Livingstone four canoes to take himself and luggage across the marsh, while the Johanna men carried the remainder round. He had seen him before; he said he saw him when he was up here with a boat a long time ago. He traced him a month's journey off, giving the names of the places in the same order as I had previously heard. He was quite willing to give me any guides to go to Maksuro, or where it once was; but he stated, as I had previously heard, that Maksuro had been driven out and killed by the Ajawa and his people almost annihilated: as also had Cóómo, two days' journey beyond. Marenga stated that the Johanna men returned after being absent two days. They gave as their reason for returning that they had merely agreed with Livingstone to take his goods as far only as they liked. The head-man stated that he had been in that direction before with him and had met the Mizitu, and that they were going no further. To prove their independence they passed themselves off as Arabs. Marenga gave them food, and they slept there one night and then set out for Maponda.

Marenga is a Babisa, and rules over a populous district; he made us a present of a bullock and as much native food for our crew as we required, and he invited us to remain a long time. He has a great number of wives—I and Mr. Faulkner being introduced to forty, who were all sitting round him.

Having satisfied myself thus far, I asked him if he thought it possible that Livingstone could have died a month's journey off, and he not know it? He at once said No, and had he died three months off he should have heard of it; but as soon as I told him I had heard that the Mizitu had killed him not far distant, he laughed, and said he told me he was going the way to avoid them, and that the Mizitu had never been in that part of the country described by the Johanna men.

Marenga then sent for a man who had gone five days' journey with him, and when he returned the Johanna men had gone back. I had previously heard the same account from the same man.

The Makololo now got very impatient to return home, and nothing was talked of day or night but the Mizitu. They stated that they had fulfilled their engagement, but I very much wished to try and get to the north end of the lake. But they would not listen to it. No inducement I could offer would persuade them to go; so there was no alternative but to go round to Maponda, get what information I could, and return.

Marenga was full of complaints about his neighbours, and what he wished for more than anything else was medicine for his guns, so that if the Ajawas came to fight him his shot would kill some one every time they were fired. We, being satisfied that Livingstone had gone on in safety, started on the 20th for Maponda, calling at the several places along the coast to gain what information I could; but all I obtained only went to confirm what I had previously heard.

Arrived at Maponda on the 25th. The chief himself was not at home, having gone on a trading expedition, leaving his mother to act during his absence. Immediately on arrival I sent a messenger to acquaint her of our arrival and my wish to see her. She soon came, with a train of followers, bringing us presents of native food and beer. She stated that an Englishman had been there a year before, had stopped three weeks to rest his party, and then left for Marenga, stopped there a day or two, and then left to go to the Loangwa, calling at Maksura, Cóómo, &c. One of the boys was left behind here, being unable to travel, having very bad feet and legs, but had now quite recovered and had gone with Maponda. She stated that the Englishman had left a paper with him, but that he had taken it with him on the journey. She brought some books belonging to him, one of which had his name on ("Wakitane, from Dr. Wilson, Dec., 1864," &c.), which she allowed me to take. The Johanna men returned this way, stopped one day, and proceeded on. She swore, in the presence of us all, that Maponda did not take away their guns, neither did any of the party die there. She stated that the Englishman was great friends with her son, and that if any one had molested him (even Marenga, as strong as he was) he would have gone to war with him. The old lady laughed at the idea of Livingstone having been killed by the Mizitu. Mr. Faulkner questioned her regarding the havildar. She gave a description of a man with straight black hair, with the top of his head shaved, &c. Mr. Faulkner states it answers the description of the Indian very well. Marenga also told us the same, and I felt convinced had he died there we should have heard it from some of the numbers I questioned on the subject.

The Makololo now told me that if I intended going into the lake again, they were not going with me; and, being entirely dependent on these men, there was no alternative but to return and to get their aid in carrying the boat back. So, having got all the news I could at Maponda, I decided on going to Makata; but although I offered a large amount for a guide, no one would attempt to cross the river. They stated that Makata had taken to the mountains for fear of the Mizitu, and they were afraid of being cut off.

Started for the Cataracts on the 27th. Found the same state of things along the river as on coming up. Arrived at the Cataracts on the 2nd of October, and commenced taking the boat to pieces. Meanwhile we heard from Chibisa that the road was clear, and that the Mizitu had made Chore, not far from the lower Shiré, their head-quarters.

Oct. 8th.—Started for Chibisa with the boat, luggage, &c.; where we arrived on the 12th. We found the boats safe, and the men left with them in very fair health. Again built the steel boat, and while there repaired the graves of the late missionaries who died there.

22nd.—Started from Chibisa.

26th.—Arrived at the Ruo, stopped and repaired the grave of the late Bishop Mackenzie. Arrived at the Kongone on the 11th of November, but on our way down we visited Senna.

H.M.S. *Racoon* arrived on the 2nd of December.

Arrived at the Cape on the evening of the 17th.

Embarked on board the mail-steamer on the 19th.

In conclusion, I must again state that this is but a brief outline of our proceedings. I should have liked to have done more by going to the north end of the lake, but was prevented by circumstances unforeseen when I left England; for, had the Mizitu not threatened Chibisa, I should have had little difficulty in getting the Makololo to accompany me. Under the circumstances, I hope that what has been done will meet with your approval, as well as that of the Royal Geographical Society.

I have the honour to be, Sir, your very obedient servant,

E. D. YOUNG.

Mr. YOUNG then addressed the meeting. He said he thought enough had been stated in his Report to convince any one that Livingstone was safe, but he would endeavour to add some further details. He would begin by saying that they had a pleasant passage to the mouth of the Zambesi, and that they had no difficulty in obtaining the aid of negroes to man the boat, the English being well remembered in this region since the expedition of Dr. Livingstone. They started the day after their arrival up the river, and arrived at Shupanga, 90 miles distant, in four days. At Shupanga he visited the grave of Mrs. Livingstone, and had it renewed; and proceeded the next day to the Portuguese settlement of Senna, where he learned that the whole of the Portuguese had been driven from the southern side of the Zambesi by the Landeen Caffres, who were formerly kept quiet by the payment of a subsidy by the Portuguese. At Tette 130 of their troops had been killed, together with three European officers, and the Governor had been taken prisoner and afterwards killed. At Senna the inhabitants had all removed to the northern shore of the river and were living in temporary huts. The Portuguese authorities received him well and entered into an arrangement to send him a number of negro labourers, in case he should find the Makololo unwilling or unable to transport his boat past the cataracts of the Shiré. On leaving Sena he passed into a new channel which had been made two years previously by the Zambesi overflowing its banks and forming a new river, connecting it with the Shiré and so shortening the distance from Senna very considerably. The main channel between the mouth of the

Shiré and Sena has become blocked up and the water taken off by this new river, which enters the Shiré close to Morombala. He had rather a tiresome journey up the Shiré. There were plenty of mosquitoes and plenty of mud-banks; but the men worked well, and in good time they reached the Ruo River, where he visited the grave of Bishop Mackenzie and had it renewed. At Chibisa they were received gladly not only by the Makololo but by the people of the old mission party; they came from miles round, and as the boat approached they were standing on the face of the hill, a black mass of people, ready to welcome them: on arriving at the beach they rushed in and seized the boat, exclaiming, "The English, our fathers, have come to see us again." They said Dr. Livingstone had been very kind to them; while he was there he was their father, and then they added to Mr. Young, "you are our father now." The next morning he met the Makololo chiefs and arranged with them for the services of 150 of their people, that is, their negro subjects, to carry the sections of the boat past the Cataracts—a number of the Makololo themselves to continue with the expedition until tidings of Livingstone were found. Upon reaching the Cataracts and taking the boat to pieces the Makololo became alarmed at the prospect of an attack from the Mizitu, and were inclined to refuse to go any further: on arriving above the Cataracts they again wanted to return home; the risk, they said, was too great—they had nobody to protect their wives and families from the Mizitu during their absence. He told them their lives were not of more value than his own. They thought they were. He asked them why. They said, "If you are killed, there are plenty of Englishmen to protect your wife." He told them if their wives were killed they could get more, and perhaps he could not. However, after a good deal of persuasion, they went on, but they did not work well and were as sulky as possible. But when they got further away from home and there was no chance of their going back, then his turn came, and he threatened to stop their wages and to give them extra work if they were not obedient. After this they got on pretty well together until they reached Lake Nyassa, where the motion of the boat in a gale of wind was so disagreeable to them that the Makololo crew all disappeared at the bottom of the boat, and nothing could induce them to get up, not even the threat of being thrown overboard. They said, "We may as well die now as by and by, for you are sure to kill us." There was nothing talked about but the Mizitu taking their wives and burning their houses down. When they had reached the end of the cataracts of the Shiré he began to hear reports of a white man having passed that way some months ago. He was satisfied from the description given that it was Livingstone who had crossed the south end of the lake. But as he was anxious to ascertain where Livingstone struck the lake, and what route he had followed, he would not stop at Mapunda, which lies at the entrance, but determined to run up to the lake at once and call at Mapunda on his way back, for if he had received decisive news at Mapunda, the Makololo would have considered their engagement terminated and would have insisted on returning to their homes. He made for the Arab crossing-place, but before they reached this part of the lake, on the eastern side, he called at two places. At the second place he met with a negro who described the dress of the white traveller; his mode of taking observations; and, in answer to questions put to him, said he had some boxes, one of which in particular was very curious, as it contained "white water" that would not wet your fingers. He was asked what the white man used the "white water" for; he replied that he placed it on the ground and looked up at the sun, and that he put up a stick which he had to the sun and then looked down it to the "white water." This man also described a watch he had seen in the traveller's possession, and said he had a little dog with him about which there was something curious, for it was said to have two tails. The negro informed them where he slept, said he knew Moosa well, adding that he had nine of his countrymen with him; he also knew the two boys, Juma and Wako, and said Wako was the tallest. He (Mr. Young) learned here that the boy Wakotani, who was supposed to have deserted Livingstone at Mapunda, had been laid up with a bad foot and left behind by Livingstone. The searching party then re-embarked and went on to the Arab settlement, on the eastern side. They learned that Livingstone had been there and had tried to cross the lake at that point. He had waited for the Arab boat, which was away on the opposite side, for ten days, and then continued his journey southward to Makata. Having obtained all this information, the party crossed to the opposite shore of the lake to find out if Livingstone had travelled northwards by that side. It was found that he had not passed near the shores of the lake. Everybody they interrogated pointed nearly in the same direction, namely, towards the west. At Levate they saw one of the men who had helped to carry Livingstone's luggage for two days. He described him in the same way as the people had described him on the other side of the lake, not omitting mention of the dog the traveller had with him. The party next made their way to Marenga, situated in the south-western bight of the lake. The people at Levate knew nothing about Marenga, and could not direct them to it; all they knew was it was somewhere down the lake. All these people would have readily informed against their neighbours if Livingstone had been maltreated or come to his end in this district; but in no single instance was the traveller spoken of as being dead. Marenga was an important place to visit, as they wanted to ascertain whether the statement of the Johanna men about being ferried by Marenga over the marsh was correct. They found it was marshy there; for the first night they had to sleep in the marsh, not being able to reach Marenga by daylight. The chief of Marenga gave Mr. Young all the information he could about Livingstone, and was exceedingly kind to the searching party. He had only seven bullocks in his possession at the time, and he gave one of these for the Makololo. These men were so hungry that fourteen of them managed to eat the bullock in three days; but then they did not require any more food for a week afterwards. If the Makololo had been willing to go forward he should certainly have continued his voyage to the northern end of Lake Nyassa. The risk, indeed, would have been great of being too late for the passage of the cataracts of the Shiré, which are not safe after the 1st of November. If the floods overtook them in November they would have to remain up the country another twelvemonth, for the river rises between the cataracts more than 100 feet. Having obtained all the information they could, they made their way round to Mapunda, and the information they obtained there corresponded exactly with what they had heard before at Marenga. He found that Wakotani had really been left behind here, as reported, but he was then absent with the chief. A book of his was given to Mr. Young, with the owner's name in it, and he now exhibited it to the meeting. He had no doubt that the white man thus described in the same terms by so many independent witnesses was no other than Livingstone; and when the Doctor himself returned in the course of time, he believed the correctness of the information he (Mr. Young) had obtained would be confirmed. This was the principal part of what he had to say. The scenery of Lake Nyassa was grand and the depth of water considerable. At some places it was 140 fathoms, and a few hundred yards distant from the shore, at the Arab crossing-place, it was 95 fathoms. Still it was full of rocks, and the navigation was dangerous; at the same time there were plenty of snug little bays along the coast, if you knew where to find them. Some of the cataracts between the Upper and Lower Shiré are also very grand. In conclusion, Mr. Young said this expedition, if it had done no other good, had left a good impression upon the minds of those who never before knew the English. Some of them had merely heard that the English at one time had been fighting their countrymen, the Ajawas. He asked one of the chiefs if he would allow his men to take the boat back, with all the provisions, for the same wages he gave going up. The chief said he wanted some of the wages paid before they started. Mr. Young said he had none with him; but if they liked to take the boat down he would pay them according to agreement, and they consented to do so. The wages were, for taking the boat up past the Cataract, and returning, about 150 miles altogether, the men finding their own provisions, eight yards of calico, value three shillings. He could not afford to give more, the boat would not carry a sufficient amount of goods for larger payments. They had 180 carriers going up and 170 coming back. They worked well both to and fro. He was certain if he were to go there again, and had a boat three times as big, he should have no trouble in getting her carried up in a week; and should he be called upon for a like purpose for the good of his country, he did not suppose he should be against going.

The CHAIRMAN said the simple, plain, and graphic narrative of Mr. Young seemed to him to carry conviction with it. The mercury, the compass, the artificial horizon, the sextant, the watch, and the book, together with many other circumstances mentioned by Mr. Young, were "proofs as strong as Holy Writ" of the safety of Livingstone. He would now propose, and he did it with infinite pleasure and satisfaction, a vote of thanks to Mr. Young. Seeing near him one of the companions of Mr. Young, it would be interesting to the meeting to hear any observations that he might wish to make.

Mr. FAULKNER said that after the distinct and detailed account given by the Chairman, and the interesting remarks added thereto by Mr. Young, any observations of his regarding the actual expedition would be superfluous; but there was one part of the journey he might make a remark about. Coming down from the lake into the Shiré, he left Mr. Young and the boat to have some hunting ashore; and on one of these excursions, after bathing in a stream, he was seized with a stiff neck. The chief of the district had never seen a white man before, and he wished to present him with a young lady. He sent one of his men with him into a kind of yard, where there were two females grinding corn—one a nice-looking girl, and the other an ugly old woman. He was about to speak to the young lady, when the man said, "You must not talk to her; you must talk to the chief." They returned to the chief, who, having asked if he liked her very much, told him to go and catch her—meaning that he should go and put a rope round her neck and take her away, as the Portuguese did. He, however, expressed his disapproval of such a proceeding by going away in a pretended rage. He went down to the river-bank, and, while he was having his luggage conveyed across, down came the chief with the girl, a rope tied round her arm, saying he had brought her to him. The girl seemed to be in the greatest terror. When the interpreter came, he desired him to say to the chief he would show him how the English treated slaves, and thereupon he cut the rope with a knife and released the girl. She fell at his feet fainting, and she afterwards told him that her own sister had been sold away, and she was always in a fright lest she should be sold into slavery. He found extensive and beautifully-cultivated cotton plantations along the upper part of the Lesungue River. The Manganja holds this part of the country in peace. At another place, the chief would not allow him to enter the village, though he had sent word to say he was coming and wanted to buy provisions. It occurred to him to take out his cornopean and play upon it. In five minutes there was not a man to be seen; they ran off in all directions, and he walked into the village and found it perfectly empty. He had killed some half-dozen fowls and had been there about half an hour when an old woman came up, and did not seem to fear him and his companions at all. He remained in the village two days, playing the cornopean almost incessantly. He met with some good elephant-shooting on the Upper Shiré, and he ascertained the fact that an African elephant can-be killed with a single shot just as easily as an Indian elephant, with the exception of a shot straight between the eyes, where the tusks grow, *i. e.* provided the sportsman goes close to him with a good gun and plenty of powder. On one occasion he came upon five elephants; and in less than three minutes four of them were dead. He shot the last within five yards of him, charging, and as it fell it struck the barrel of his gun, knocked him down, and broke the stock of his gun. In conclusion, he was glad to have the opportunity to thank Sir Roderick Murchison for permitting him to accompany the expedition; and also to thank Mr. Young for his kindness on many occasions in allowing him when he went on these hunting excursions to take what provisions he pleased.

The Rev. **HORACE WALLER** (formerly lay member of Bishop Mackenzie's mission) said he had not the slightest doubt that Mr. Young had traced Livingstone for many days' journey beyond the point where the Johanna men deserted, and he was in hopes the Doctor was now far away to the northward. The Makololo would certainly have known of Livingstone's death, if it had really occurred at the southern end of Nyassa. The chiefs told Mr. Young all they knew about Livingstone. In that circumstance there was the best evidence of his safety. Had anything occurred to Livingstone there would have been silence on the subject. The idea with these chiefs is that they are responsible for any harm that happens to a traveller anywhere in their neighbourhood; and the chief of Marenga telling Mr. Young at once that Livingstone had been there and had gone on in safety, showed that he could speak of him with a clear conscience. The mention made of the dog, he thought, identified Livingstone in a singular way. When Bishop Mackenzie was in the country, he (Mr. Waller) had a dispute with Livingstone about a passage in Buffon's Natural History, in which it was stated that the tail of the dog curled to the left. Livingstone was fond of any playful dispute of this kind, and he took the greatest pains to find out all the dogs whose tails turned to the right. Now, it was very likely he and the boys (who had lived for years with Mr. Waller) had met with a dog whose tail curled the right way for the Doctor: then the old joke would revive. The boys would be always talking of the "crow" they would some day have over their former friend, and it was quite easy to see that an attempt to explain the fun to the other natives had given rise to the story of a dog with two tails. This seemed the more probable, because it was only current in the villages where they had remained long enough to chatter to their hearts' content. Other natives spoke of the dog, but merely honoured him with the usual allowance of tail. There was no doubt, from what Mr. Young had told him, that the English name maintained all its old fame in that part of the country. It was most gratifying to those who had been in the country before to hear that the whole country side came down to meet Mr. Young, and that on the lake the English were thoroughly understood. The Portuguese were understood also, but that was all to the bad. Allusion had been made to some further attempt to stop the slave-trade in that part of the country. Livingstone wished the attempt to be made on Lake Nyassa. Mr. Young had proved that in seven months out and home he could make a voyage to that lake, and that a small vessel could be taken up with the greatest ease. Now, he had no hesitation in saying that a party of plucky Englishmen might go up there and do more good in stopping the slave-trade than all her Majesty's cruisers would do on the coast. The Sultan of Zanzibar received tribute on 20,000 slaves last year. All these slaves had come from the Nyassa district. Livingstone had a tremendous journey before him yet. He had no doubt he had gone to the west to examine the small lake he had formerly heard of south of Tanganyika. He believed he would then go to Lake Tanganyika, and that we should next hear of him at Alexandria.

Sir **SAMUEL BAKER** said, as an African traveller, he felt the greatest pleasure in being a listener, and applauding all that he had heard. But after the remarks that had just fallen from Mr. Waller, he felt it was his duty to give an opinion. As Dr. Livingstone was last seen with only nine armed followers, it was almost impossible we could expect him to come through by Alexandria. He rather hoped that in a very short time we should hear that he was on his return to Zanzibar. At the same time it struck him as an extraordinary fact, that we had heard so much *of* Livingstone, but, unfortunately, nothing *from* him. Therefore he would recommend the meeting not to be buoyed up with too much hope. He confessed he had none last year; but now he was more sanguine, because it had been proved most satisfactorily that Moosa and the Johanna men had told lies. There was one thing he felt inclined to suggest, although there were no means to carry it out. In the Geographical Society they were in the habit of bestowing honours wherever they were due; but they had no power to bestow punishment. Moosa and the Johanna men had deserted Livingstone, and had put this country to some expense in the search for Livingstone, to say nothing of racking the hearts of those who were near and dear to him. Lions, panthers, and cats of all kinds, were produced in Africa: but there was one other " cat " which he wished could be sent out to the Consul at Zanzibar and administered to these men, and that was the British "cat-o'-nine-tails." He must abstain from giving an opinion with regard to Livingstone's movements, because every step in Africa depended upon circumstances. All they could do was to trust that in a short time they should receive some official communication from Livingstone himself through the Consul at Zanzibar.

The **CHAIRMAN**, in reply to the observation that no intelligence had been received from Livingstone himself, reminded the meeting that Dr. Kirk in his last communication stated that Livingstone had sent letters by a native trader who was delayed on the way; and by this time the trader might be at Zanzibar. At all events, Sir Roderick Murchison was in early expectation of news to that effect.

Sixth Meeting, 10th February, 1868.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*J. A. B. Horton, Esq.*, M.D.; *W. Rhys Williams, Esq.*, M.D.; *Herbert Evans, Esq.*

ELECTIONS.—*Rev. T. Coney*, M.A.; *Edward Cook, Esq.; H. M. S. Graeme, Esq.; Major E. Hunter; H. F. Makins, Esq.; Captain C. H. Riley* (Madras Army); *A. R. C. Strode, Esq.*

ACCESSIONS to the LIBRARY, from 27TH JANUARY to FEBRUARY 10TH, 1868.—Knolles' 'Turkish History,' folio. Pocock's 'Arabia,' 4to. Pearce's 'Abyssinia.' Light's 'Nubia.' Rhodes' 'Jerusalem.' Le Blanc's 'Voyages.' Duhalde's 'China,' in two vols. folio. All by purchase. Blackie's 'Imperial Gazetteer;' Fullarton's 'Imperial Gazetteer and Atlas.' Donors, the Publishers. 'Description of Darien in 1754,' translated from the Spanish by J. Power, Esq.

Donor, the Translator. Townsend's 'Journey across the Rocky Mountains.' Purchased. 'Life of Prince Henry of Portugal, surnamed the Navigator, and its Results.' By R. H. Major, Esq. Donor, the Author. 'Banking in Persia,' by Delacy O'Brien, Esq. Donor, the Author. 'An Introduction to the Study of National Music,' by Carl Engel. Donor, the Author. 'Report of the Trans-Himalayan Explorations (Topographical Survey of India), 1865-67,' by Captain T. G. Montgomerie. Donor, the Author.

ACCESSIONS TO MAP-ROOM SINCE THE LAST MEETING.—New Zealand.—A Map of the Northern Island, showing the scene of the Military Operations of 1863. Presented by the War Office, through Sir E. Lugard. Africa.—A Sketch Map, showing the Track of Mr. Young and Party in search of Dr. Livingstone, 1867. Presented by Mr. Young. Two Maps of South Africa. Presented by A. Petermann. Route Map of Abyssinia, showing the advance of the British Expedition of 1863. Presented by the Topographical Office, through Lieutenant-Colonel-Cooke, R.E. America.—A Map of the Argentine Republic, showing the Provinces of Tucuman and Catamarca. Presented by A. Petermann.

The PRESIDENT said that although to his deep regret he was prevented by illness from being present at the last meeting of the Society, at which the complete success of the Livingstone Search-Expedition was happily recorded, he expressed to the Society by letter his sincere gratification at the result, and suggested as the most probable hypothesis that the great traveller would come out of Africa by Zanzibar. For, supposing that he had determined the great problem of the outflow of the waters from Lake Tanganyika, whether to the west or to the north, that problem being solved, he would not, he thought, with his small force, attempt to force his way through the kingdoms of Equatorial Africa, and make his way to the Nile. He wished, however, to say that if, through any advices we may receive, it should transpire that Livingstone had resolved to try to pass to the north through Equatorial Africa, in that case the Society might rest assured that the Council would be prepared to make every effort to organise a relieving expedition from Egypt, with the aid of the Viceroy, and probably according to a plan which has been suggested by Sir Samuel Baker.

The Paper of the evening was,—

On the Exploration of the North Polar Region. By Captain SHERARD OSBORN, R.N., C.B.

WHEN last I had the honour to address this Society touching Arctic Discovery and Exploration—on January 23rd, 1865, just three years ago—I submitted the following propositions, and endeavoured to convince you of their importance, and the comparative certainty and safety with which our conclusions might be carried out.

In the first place I argued, and still maintain the importance, in a generally scientific, and especially in a geographical point of view, of an exploration of the area around the Northern Pole of our Earth.

In the next place I maintained, and strenuously do so still, the desirability, in a national and naval point of view, of keeping open that school of enterprise and adventure, combined with scientific research, which Arctic and Antarctic voyages have ever offered to British seamen in times of peace—a school of hardship and endurance, a field for men who will lay to their hearts the great truth, that

> " For sluggard's brow the laurel never grows,
> Renown is not the child of indolent repose "—

a scene of action in which in by-gone times were trained the hardy seamen and officers who broke the power of Spain when she aspired to crush this England of ours—and is still a field for active service, more than ever needed for our navy, when armoured war-ships lie months in harbour for a few hours at sea, and a dead level of mediocrity, from an especial education and uncompromising routine, threatens to destroy the individuality of my profession, and to leave the junior grades without one glimpse of hope beyond the coat-tails of some great admiral, which they are to grasp if they can.

Lastly, I argued that, although there were, I owned, three routes by which the unknown Polar area could be reached—viz., by Spitzbergen, by Behring's Straits, and by Baffin's Bay—I showed what I considered good grounds for saying that the last-named route—viâ Smith's Sound and Kane's Channel — afforded the best hopes of success, because the farthest known land was nearer the Pole than the Spitzbergen Isles; because there was every reason to think that the land extended still further north in Smith's Sound; because animal life, and the existence of Esquimaux in that high latitude where Kane wintered were additional guarantees for the health and comfort of our explorers; and lastly, because from Smith's Sound to Upernavik (a Danish settlement in Greenland) a certain boat-voyage could always be made every season, so as to insure communication with England annually. For all these reasons many of you concurred with me in thinking that the Baffin's Bay route was the right one. Unfortunately for the speedy resumption of Arctic research at that time, an eminent German geographer, M. Augustus Petermann, came forward with a theory in favour of the existence of a passage for ships to the Polar area somewhere between Nova Zembla and Greenland. He urged, in the face of all our bygone experience, that as the Gulf-stream must flow into the Polar Sea, by following its course a watery highway would assuredly be found. I fully recognised at once the serious nature of the difficulty, so opposite an opinion from one so deservedly eminent as Augustus Petermann would occasion. It was like trailing a red herring across a breast-high scent; and I own that a split took place in the Arctic camp, of which advantage was taken in official quarters, to say to your President as well as to me, that so long as Arctic authorities could not agree as to the best route to the Pole, Government were not likely to entertain any such project; and there were many who chuckled in triumph at the difference of opinion which enabled the dear old navy to hobble on its macadamized highway of crossing royal yards and adhering to routine.

Grieved though I was to defer the prosecution of my idea, I felt anything was better than to see in these days ships go on a Polar voyage, via Spitzbergen, and return empty-handed. I preferred, therefore, to be patient, confident that the Swedish Royal Expedition would tell all I anticipated of open water in that direction, and that the yearly travels of our steam whale-ships to Baffin's Bay would throw additional light on the Smith's Channel route.

To-night, with your kind permission, I propose to show what additional proofs I can of the merits of the Baffin's Bay route for the exploration of that great area within the 80th parallel, which is just a week's steaming * from our coasts, and contains one million one hundred thousand square miles † of unknown sea or land.

Dealing first with the Spitzbergen route, let me say that I fully recognise the importance of a ship or ships being sent to follow up the course of the Gulf-stream, that mysterious river of warm water flowing through the wastes of the ocean, and to which we owe, under Providence, our blessed immunity in Great Britain and Norway from the paralysing rigours of a Labrador winter; that stream, equal to fifty Niles in volume and length, ought—for a thousand reasons, which I will not pause to dilate upon—to stimulate the sailors of this sailor-nation to explore it from its fountain-head to where it debouches or recurves amidst the solitudes of the frozen North. Full of interest are its mysteries, and I sympathize with the learned President of our Royal Society, as well as the German philosophers, who would place it as a subject of prior importance, scientifically speaking, to mere geographical exploration. But I submit that wherever we penetrate the Polar area, we shall strike upon the Gulf-stream in some shape or the other—from Melville Island to Nova Zembla down every channel have minor branches of that stream been encountered, on every shore has it left its mark in

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* 1200 miles from the Shetlands.

† Miles square, 1,131,000.

drifts and wrecks carried from many a foreign land, and I plead, Let us explore first; then let knowledge be perfected by men of perhaps greater scientific acquirements than the sailor-officer. I want to be sure of the *expedition which first goes on this work getting well into the area before us and safely back again.* Therefore it is that I reiterate my objection to the Spitzbergen and Nova Zembla route for England's *first* essay with steamer and sledge to explore the Polar area.

No one, except a groggy Dutch skipper, ever got, I say, north of 80° on the east side of Spitzbergen, and on the west Scoresby's highest once, in a lane of water, was only 81½° N. latitude. In both cases the hindrance consisted in endless fields of ice streaming ever southward. Parry, in 1827, was told that, if he launched boats over a certain extent of ice-field, he must reach open water. He toiled in 1827 with his gallant crews in this endeavour. What he marched a-head one portion of the day, he was drifted back by the southerly action of the ice, and only reached 82° 45′ N., when he desisted, beaten by the ice-drift: had there been land or fast-floe he might have succeeded. It may be said, Let it be tried when the autumn arrives, and the summer's ice-drift shall have left open water for ships. I reply, Remember the latitude you are dealing with.

If you are in earnest in wishing to see Arctic exploration pursued by our sailors, until the secrets of the Polar space are laid bare to human knowledge, we must not commence by a rash Polar voyage.

"Pas à pas on va loin" is a thoroughly sound Arctic motto. Send, if you please, a good steamer to trace out the autumnal ice-edge and limits of the Gulf-stream between Nova Zembla and Spitzbergen, and establish a small party of ten persons for a *winter's sojourn*, to procure meteorological observations at the north extreme of each of those places; but make your first deliberate essay towards the Pole elsewhere, where there is less risk to life, more certainty of success.

Although, for reasons to be presently explained, I shall refrain from saying one word to dissuade other nations from taking either the Behring's Straits or Spitzbergen routes in the united attempt I desire to see in 1869, of an exploration of the Pole, still in justice to all concerned, and as our duty as geographers, we must place on record the results of the experience of recent sound observers and explorers in the neighbourhood of Spitzbergen and Behring's Straits.

Hear what the Report of the transactions of the Royal Swedish Academy of Sciences says of the result of three scientific expedibe found. I fully recognised at once the serious nature of the difficulty, so opposite an opinion from one so deservedly eminent as Augustus Petermann would occasion. It was like trailing a red herring across a breast-high scent; and I own that a split took place in the Arctic camp, of which advantage was taken in official quarters, to say to your President as well as to me, that so long as Arctic authorities could not agree as to the best route to the Pole, Government were not likely to entertain any such project; and there were many who chuckled in triumph at the difference of opinion which enabled the dear old navy to hobble on its macadamized highway of crossing royal yards and adhering to routine.

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Hear what the Report of the transactions of the Royal Swedish Academy of Sciences says of the result of three scientific expeditions, since 1861, to Spitzbergen, touching the probability of a water-channel being found north of that island :—

" During the last years the idea has been vindicated that the Polar basin is composed of an open sea, only here and there covered with drift-ice. The learned geographer Dr. Petermann has even asserted that it would be as easy to sail from Amsterdam Island (79° 47′) to the Pole, as from Tromsö to Amsterdam Island.

" This view is in itself so contrary to all experience that it scarcely merits refutation; but as different prominent English Arctic navigators seem inclined to adopt the same view, in spite of the experience gained by their own numerous Arctic expeditions, we will here give some of the most important reasons against this supposition.

" All who for a longer period have navigated the northern seas, whalers and Spitzbergen hunters, have come to the conclusion that the Polar basin is so completely filled with ice that one cannot advance with vessels, and all the attempts that have been made to proceed towards the north have been quite without success. Passing by older voyages, we will here only mention the following. In 1773 Phipps made an attempt to reach the North Pole by way of Spitzbergen, but cruised the whole summer, as late as the 20th of August, north of Spitzbergen, without being able to reach the 81st degree of latitude. In 1818 Buchan and Franklin repeated the same attempt, but without reaching a higher latitude than 80° 31′. The ice was high and closely packed; no navigable aperture was observed in it, and the ships were considerably damaged. Scoresby, who for so many years cruised in the waters between Spitzbergen and Greenland, succeeded only once in attaining 81° 30,′ without any possibility of advancing further north, although a considerable aperture in the ice was seen extending from east to west. In 1827 Parry endeavoured to push forward from Spitzbergen to the Pole in boats drawn on sledges. He advanced on closely-packed broken ice to 82° 25′ latitude; he could from this point, on the 23rd of July, not see any trace of open water to the north (Parry, 'Attempt to reach the North Pole,' pp. 100-105), and encountered on his return navigable water first at 81° 34′ (p. 118).

"Torrell and Nordenskiöld ascended, during the expedition in 1861, on the 23rd of July, a high top on Nordeast Land, Snötoppen (80° 23′ lat.), without being able from that height to see trace of open water to the north of the Seven Islands. A few days later, when the ice between North-east Land and the Seven Islands was separated a little, they could push forward as far as to Parry's Island, though they, even from the highest tops on these islands (1900 feet, 80° 40′ lat.), could see nothing but ice northwards.

" From the top of White Mountain, at the bottom of Wijde Jans Water (3000 feet) we could, on the 22nd of August, 1864, not see anything but ice between Giles Land and Spitzbergen. Some vessels that had the same year attempted to sail round North-east Land were shut up by ice, and had to be abandoned by their crews. Before leaving the ships, an attempt was made to sail north, in order to return this way to Amsterdam Island, but they were soon met by impenetrable fields of ice.

" Notwithstanding a high prize has been offered for the reaching of high degrees of latitude, none of the whalers, who else sail boldly wherever the hope of gain allures them, have considered it possible to win this prize. They would certainly not have neglected to make an attempt, had it been possible, as Dr. Petermann asserts, to sail to the Pole in three or four weeks.

" We have had opportunities of speaking to most of the masters of vessels sailing to Spitzbergen. They make their richest booty during autumn, and stay, if possible, at Spitzbergen till September or the beginning of October. At this time they are accustomed to visit Moffen (80° lat.) in order to kill walrus on land. They testify unanimously that, although the packed ice at that time of the year sometimes moves from the coasts of Spitzbergen, yet that the ice-blink that appears in the north, and the rapidity with which the ice at northerly winds comes down, evidently proves that the distance between the southern border of the ice and the north coast of Spitzbergen cannot even then be very great. The northern ice-fields are, even in autumn, quite close.

"All experience hitherto acquired seems thus to prove that the polar basin, when not covered with compact, unbroken ice, is filled with closely-packed, unnavigable drift-ice, in which, during certain very favourable years, some larger apertures may be formed, which apertures, however, do not extend very far to the north. Older narratives by Dutch whalers, who are said to have reached 86° or 87°, nay even 89½°, must therefore be received with the greatest diffidence, if not looked upon as pure fictions, and the prospect of being able to advance with vessels from Spitzbergen to the Pole is no doubt extremely slight. It would be particularly unwise to choose the spring for such an attempt, and the passage east of Spitzbergen. At that time and by that passage it would be difficult, if not impossible, to reach even 78° of latitude. Whereas, on the west side, one can every year depend upon reaching the 80th degree of latitude, and in favourable years it might be possible, in September or October, to sail even a couple of degrees higher."

If Mr. Otho Torrell were here to-night he would, I feel sure, be able to tell you how fully these results of the investigations of the Swedish expeditions bear out the opinions I gave him in London; those opinions being, as I have said, based on the experience of the three previous centuries by our seamen and navigators. I have merely to add that the French, in their publication entitled 'Renseignements Hydrographiques'* fully support these opinions.

However, M. Petermann, I am bound to say, thinks otherwise, and he is supported in his views by some of the most eminent men of science in this country, who, like M. Petermann, assert that the Gulf-stream must open a highway for a properly equipped steamer through the Polar pack, and that it has only to be fairly tried to be successful. What is better still, the attempt, I have reason to hope, will really be made, and from a quarter which gives, in the quality of its seamen and the earnestness of its people, every chance of faithful devotion to the object in view. I wrote to M. Petermann the other day, pointing out that, if we could only be agreed as to the division of the labour and the routes towards the Pole, Germany taking one, France another, and America and ourselves another, that I thought our common object—Polar Exploration—would be successfully accomplished. That gentleman, I am bound to say, met me in the kindest and frankest manner; and, after upbraiding me for calling him a philosopher in my letter to the 'Times'—a crime which I beg to say I was unwittingly guilty of, and am most sorry for—M. Petermann says:—

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* See 'Renseignements Hydrographiques,' Paris, 1866, p. 186. Published au Dépôt des Cartes de la Marine. Par A. Le Gras, Capitaine de frégate.

> "I lose no time in sending you word that, for the execution of a German expedition to the North Pole, M. Rosenthal, of Bremerhaven, offered me his excellent span-new screw-steamer the *Albert*, of 450 tons, last September; and, to make the expedition still better found, he last week, in addition, offered me a second smaller steamer, the *Bienenkorb*. The expedition is to be got up for 1869, and, to take for its basis, the sea between Greenland and Nova Zembla."

Now, this looks like work, and God forbid we should do anything than help these gallant Germans in their enterprise, and the young navy of the great Northern Confederacy could not have a nobler or better field on which to win its laurels.

Let us next turn to the Behring's Straits route, a route which our Gallic allies are bent on essaying. The Geographical Society of Paris, I learn from its talented secretary, M. Charles Mannoir, takes a lively interest in a fresh effort to explore the Polar seas; and the enlightened Emperor of the French has been one of the first to encourage the project laid down by M. Lambert. I feel sure they will carry with them our best wishes, and that this Society will not stint praise or honours for all they may do in that direction. Herald Island marks on that chart the furthest known land our ships had ever reached into the Polar Sea by that highway; and until to-day all that was known beyond rested on an official report, which runs as follows, from Captain H. (now Rear-Admiral) Kellett, dated August 17, 1849, Behring's Straits:—

> "Still more distant than this group (*the Herald Isles*) a very extensive and high land was reported. There was a fine clear atmosphere, except in the direction of this land, where clouds rolled in immense masses, leaving occasionally the very lofty peaks uncapped, where could be distinctly seen columns and broken summits, which is the characteristic of the higher headlands in this sea—East Cape and Cape Lisburne for example. It becomes a nervous thing to report a discovery of land in these regions without actually landing on it, after the unfortunate mistake to the southward ('Wilkes's U. S. Expedition to the Antarctic Regions'); but as far as a man can be certain who has 130 pairs of eyes to assist him, and all agreeing, I am certain we have discovered an extensive land."

He then adds that the land he saw was probably a continuation of the land mentioned to Baron Wrangel by the inhabitants of the Siberian coast as being occasionally seen from Cape Yakan. Wrangel therefore first heard of this new land, and Kellet first established its existence, as far as his modesty and caution would allow him to claim it.

Last year, no less than four enterprising American whaler captains* saw this land again, and give us certain points well fixed by astronomical observations.† I am indebted to our distinguished president, Sir Roderick I. Murchison, for by far the fullest account of these discoveries; they are carefully laid down on the chart before you, and the records are concisely as follows:—

Captain Long, of the *Nile*, says he saw the new land on the 14th August, 1867, about 18 miles distant. By good observations he made the west extreme visible to be in lat. 70° 46′ N., long. 178° 30′ W. The lower portions of the land were entirely free from snow, and seemed as if green with vegetation. Broken ice between the land and ship precluded a nearer approach. The *Nile* sailed easterly along the land all the 15th August and part of the 16th, but did not approach it nearer than 15 miles at any time.

The 16th August was a clear day; had a clear view of the land; made the S.E. extreme point by good observation to be in lat. 70° 40′ N., long. 178° 51′ W. Saw a mountain in about long. 180°, which looked like an extinct volcano, and by rough measurement was 2480 feet high, and from the *Nile's* decks mountain ranges were seen extending northerly as far as the eye could reach.

Captain Bliven, of the *Nautilus*, says he saw land north-west of Herald Island extending as far north as lat. 72° N., and whilst cruising in 71° 20′ N., long. 175 W., he traced lofty mountains in this new land extending to the north-west.

Captain Raynor, of the *Reindeer*, says he sailed along a new land, which had only been previously marked on his chart as *extensive land with high peaks*, and by good observations he placed a cape to the south-west in lat. 70° 50′ N., long. 178° 15′ W., and another cape to the S.E. he places in lat. 71° 10′ N., long. 176° 40′ W. The land about this south-east cape he describes as high, rugged cliffs and barren grounds, and the coast beyond it turns north-west for 15 or 20 miles, and then north and north-east to the north of 72° N.

Mr. Whitney, in his letter to Sir Roderick Murchison, says: "After many enquiries among the officers of the whaling fleet, the correctness of these statements is *fully confirmed*," and adds that "*one shipmaster who has been as far north as* 74° N., *and nearly due north of Herald Island, could see peaks and mountain ranges far to the north-west of his position.*" We may safely, therefore, place this land on our charts; and, in general terms, I may add that it lies about 70 miles distant from the Siberian coast; that the coast has been closely traced for 100 miles, and sighted here and there for 500 miles; that the south face visited seemed more fertile than the Siberian coast—drift-wood was seen, and abundance of walrus. The sea, though only 15 to 18 fathoms deep 40 miles off the land, was singularly blue, and it only needed a screw-steamer to have easily effected a landing.

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* Long, of the *Nile;* Raynor, of the *Reindeer;* Phillips, *Monticello;* Bliven, *Nautilus.*

† See 'Pacific Commercial Advertiser,' published in the Sandwich Islands at Honolulu, together with the editorial remarks of H. M. Whitney, Esq.

Some of our enterprising American captains felt convinced the new land was inhabited, and Captain Long says he is assured of it, for on a cape a little westward of and opposite to Cape Yakan, he noticed an immense number of upright and prostrate columns, like obelisks or landmarks, and that "they were scattered over a large surface, and in clusters of 15 or 20 each, with intervals of several hundred yards between them."

The existence of an island in 170° w. long., about north-west of Point Barrow, with a channel separating it from this new land, is likewise reported. Thus you see, brother geographers, in spite of the "masterly inactivity" of the British navy since M'Clintock's voyage in the *Fox*, knowledge of the Arctic zone is still progressing, and to American sailors belongs the credit of verifying the report of a Polar land north of Siberia, as told to Admiral Wrangel in 1820 by the Tschùktchi tribes of Cape Yakan, and a glimpse of which was first seen from H.M.S. *Herald* in 1850.

It is satisfactory to know that human knowledge does progress, though Britons may begin to despair of our part in conquest over man, or over nature; and we may say to the Dame Partingtons who put on their pattens and flourish their mops because we will not rest and be thankful,—a fig for your scolding, the world will keep moving.

Now, it is towards Behring's Straits that the attention of French geographers has been directed by the persevering advocacy of M. Gustave Lambert, and he, it is said, will be ready to start on his exploration of the Polar area by that route early next year or late in this. So that, with the violets of 1869, we may reasonably hope to see the sailors of Germany striking northward, on the one hand, and those of France on the other. Surely you will feel with me that we should be playing our part at the same time, and by the route which of all other sbelongs to the sailor explorers of our race—Davis Strait and Baffin's Bay. There, since our navy turned from a field in which it had honourably distinguished itself from 1818 to 1860, the enterprise of Americans in geographical exploration, together with the introduction of steam-power amongst our British whalers sailing from Hull, Dundee, Aberdeen, and Peterhead, have contributed much to dispel vague difficulties and dangers really incident to Arctic navigation in the dear old-fashioned sailing-ships.

Since 1855 there is not a season in which British screw-whalers have not navigated Baffin's Bay. There is hardly a season in which vessels have not voluntarily wintered on the western shores of Davis Straits in the hope of a good cargo of fish-oil by autumn or spring fishing.

The introduction of steam as an element of safety and success in Arctic navigation was due to the English navy, and that fact, together with the information we gave, of how to winter with health and comparative safety, was turned to account by our intelligent brethren of the whaling fleet, and to the advantage, I believe, of an important branch of commerce and school for seamen.

When I tell you, therefore, that not only have whalering men recently voluntarily wintered on the west land, but that their wives have in several cases done so too, I maintain that the Arctic feat is robbed of half its terrors. Mr. Penny, of Aberdeen, has been accompanied by his wife more than once; as recently as 1867, some ladies returned from a winter in Exeter Sound. And, after all, why should not English wives go with their husbands to latitudes where Danish ones have cheerfully gone for years? But are Englishmen going to tell me that where these poor women dare to go for love you will not go for honour and zeal, and that what will add to our country's honour and the extension of human knowledge entails a risk which the adventurers should shun? You will say, may be, that such a region is only intended for an Esquimaux to exist in, that the European must perish on such a dietary in such a climate. I point to the American Mr. Hall, who, encouraged by the generous support of Mr. Grinnell and his friends in New York, has subsisted, since May 1860, for nearly seven years, in regions immortalised by the sufferings of Frobisher and Hudson of old, and rendered memorable in our times by the achievements of Parry, Back, Lyons, and Rae.

Knowledge has indeed been power to the men of to-day—ably have they availed themselves of it, whether it be such as the *Queen*, of Peterhead, who in 1866 wintered between Lancaster and Jones Sound in safety, those who this year returned from wintering in Exeter Sound, or those ships of America and Newfoundland who made a summer trip to Repulse Bay in search of whales, and left Hall encamped there last August—all attest how much further we are in advance to-day of the secret of voyaging and sojourning with impunity in those seas than we were thirty years ago.

The fact is, they have our Arctic experience to help them—good steamers, good charts, and a thorough knowledge of the land and the shelter harbours afford, from Cape Farewell to Smith's Sound: more than that, these fishermen and Mr. Hall have all found much aid and comfort from the supplies afforded by the natives who have, on both sides of Baffin's Bay, been found as high as any one has wintered; and it is this, together with the known abundance of animal life up Baffin's Bay and Smith's Sound, which makes me urge it as the proper highway to the Polar area. For believe me, the mere *coup de théâtre* of hoisting a flag on the spot called our Pole and singing "Rule Britannia," or "Hail Columbia," is not the object of my efforts.

You must bear in mind that, so far as English attempts to penetrate up Smith's Sound are concerned, no expedition has attempted it, and no *steamer* can be said to have fairly entered it before the *Arctic of Dundee.* Baffin, in 1816, sighted the entrance in a sailing-craft of 55 tons. John Ross did as much in 1818, in a bigger ship. During the search for Franklin's expedition I sighted its portal in a screw, the *Pioneer*, but at a distance; Inglefield, in a small-power screw-vessel, the *Isabel.* He advanced just within the entrance, laid down the shores very roughly, by eye-sight. He says of this strait, "My own impression is that there was nothing on the east shore that would have prevented our steaming through." Next came Dr. Kane, in the *Advance* sailing-brig, deep laden, and blown about by the strong gales of such a funnel between two seas, and he was followed by the sailing-schooner of Dr. Hayes, who was not able to reach, in so frail a craft, as far as Kane, and wintered, as you see, at a spot southward of Kane's position.

Therefore, I repeat, this route has never been attempted by any expedition under the conditions which we now know constitute the true elements of success: 1st, a good steamvessel, and 2ndly, such resources in sledges and men as shall enable autumn and spring journeys to be accomplished without wanton risk to life, and a certainty of careful exploration.

Recently, it is true, a ship in search of whales did enter this strait,—the *Arctic* of Dundee; and all honour, I say, to him, and those fishermen of America as well, who in their adventurous calling do not hesitate thus to tread on the heels of, and in some cases surpass, the Arctic explorer. Captain Weils' affidavit is as follows—the italics in brackets being my insertion, to explain the statement to those not conversant with the localities.

STATEMENT of Captain RICHARD WELLS, of S.S. *Arctic*, Dundee, Season 1867.

"On June 19th, passed Conical Island (*Crimson Cliffs of Beverley*). There being much ice in the country, we had to pass between it and the mainland. Made fast for a short time to the land-ice off Petrowack Glacier, and rode out a gale of wind from S.S.W. (*by compass*).

"Then steamed close along the land, there being no land-floe. Passed Cape Athol with two ships' lengths. Two natives came on board. Got into open water. Passed between Rocks Dalrymple and Arabella.

"Then steamed to the westward, but found the ice a very heavy pack, impenetrable. Carry's Island then in sight.

"Followed the ice edge along, which led us once more back to the mainland (*Greenland*). Went ashore at Cape Parry, and saw open water to the north, off Hakluyt Island. Made fast to the land-ice in Whale Sound, and had seven natives on board from Netilik (*see* 'Kane's Voyage and Report of H.M.S. *North Star*.')

"Next day steamed past Hakluyt Island within quarter of a mile of it. Got into open water, and steered west true. No ice to be seen from the masthead to the north.

"Made the land-floe on the west side of Smith's Sound, off Talbot and Cadogan Inlet—very heavy ice. The pack to the southward jammed lightly in upon it (*the land ice*), and impenetrable.

"Made fast to this west land-floe, and saw numbers of white whales, bears, seals, unicorns, and walrus.

"Thence sailed north in search of fish. The land in sight, high and bold on both sides, continued northward until we opened out Smith's Sound; Humbolt Glacier being in sight, through the glass, from the masthead.

"When we tacked and came to the southward, there was no indication of ice to the northward; the sky blue and watery, and only a few small streams of light ice to be seen.

"We were then *to the best of my belief*—no observation having been taken—about 79° N. latitude.

"Stood to the southward to attempt a passage to Pond's Bay, and were for several days dodging about in this north water. A heavy breeze occurred from the north, which raised a considerable sea, so heavy that we were compelled to hoist our boats close up. I believe that had we not been upon a whaling voyage, and I should have continued my course to the northward had I seen a fish, we should have met with no difficulty in attaining to almost any extreme northern latitude.

"This report has been dictated by me, and to it I append my signature this 25th day of November, 1867.

(Signed) "RICHARD WELLS, Master.

"On board S.S. *Arctic*, Dundee."

I am indebted to our worthy associate Allen Young for this record.

Thus you find a whaler steamer in "open water" very early in the season in Smith's Sound. Inglefield found it open—Kane was stopped by no impenetrable barrier in his first entry. He only, in my opinion, needed steam-power, for the ice was all in motion—now going south, now north.

Let me now call your attention to this diagram of Smith's Channel and Kane's discoveries. Mr. Petermann has shown it in three different maps. I give it you in one, with the kind assistance of Captain George, of this Society. The black line is Dr. Kane's, in 1855; and the red line is Dr. Hayes' alterations of Kane's work.

The discrepancy between Inglefield and Kane is easily explainable. The former was steering about for a day, just inside the entrance of the Strait; he never landed, could not and did not profess to make a survey, and only made a very usual mistake for Arctic novices—he over-estimated the distance he could see. Dr. Kane's winter quarters are, I believe, excellently fixed by his astronomer-in-chief, poor Mr. Sontag; and Kane, at page 384, vol. ii., gives, in his table of positions, no less than five other places as fixed by positive observations by double altitude and artificial horizon. I am, therefore, utterly at a loss to understand on what grounds Dr. Hayes alters and stretches out his coast-line of the western coast, without giving us any data to justify his proceedings.

Capes Hawks, Prescott, and Frazer are all fixed astronomically, Dr. Kane tells us, and Cape Andrew Jackson likewise. I therefore say, until Dr. Hayes produces his observations, we should adhere to Kane's chart.

I never had a more difficult task in my life than to try to understand from Dr. Hayes' journal what he did on his journey from his ship to the Polar Sea and back again. I was in hopes of being able to say I am satisfied that he has traced the land even farther north than Kane thinks it exists. All I can be sure of is that he says he reached a point which agrees with Kane's Cape Cracroft, and that he saw a headland farther north, some 60 miles off, or in latitude 82° 30′ N., whilst he was in 81° 35′ N.

It is a great pity that Dr. Hayes, in his anxiety to make a pleasant book for reading, should have destroyed the simple character of his daily journal, so as to prevent anyone tracing his daily work. He alludes to certain observations as having been sent to the Smithsonian Institution of Washington. I believe this Society has applied for copies of them. I hope they will be accorded, as they will solve many interesting geographical questions.

But, correct surveying apart, Dr. Hayes gives us other information, which he did understand, of an interesting nature; and I should not have alluded to the accuracy of his map had it not been a matter of importance in the subject before us to know on what facts it was asserted that a future explorer would have the ground cleared before him to such and such a latitude.

The temperatures recorded in Dr. Hayes' winter quarters confirm the fact often observed by other Arctic voyagers in high latitudes, that during the winter, in heavy northerly or north-easterly gales, the temperature rose with the violence of the storm, and fell immediately the gale subsided. This, in Smith's Sound, as at Northumberland Sound and Griffith's Island, merely, I suspect, tells a tale of a disruption of the surface of the ice-covered seas beyond the Arctic traveller, and warm vapour rising from those storm-beaten spaces.

He did reach Cape Hawkes in the spring, and at Cape Frazer, opposite the centre of Humbolt Glacier, found Esquimaux ruins, and again at other points found more traces. On his return, the natives insisted that had he gone further he would have found the west-land Esquimaux. Lastly, Hayes, like Kane's people, was stopped by open water in the throat of the Strait.

His Esquimaux friends on the east side said he would find on the west land traces of more of these people, and that if he went far north he would come to living natives and good hunting-grounds, with "plenty of musk oxen."

Thus again, I say, here you have a continuous land as far as man has gone or seen, that land of the same geological type of the Melville Island, which we have elsewhere found to be so abounding in deer and musk oxen; we have every reason to think the natives will be found there. All travellers have been stopped by water—mark that!—and that sea yielding what will support human life or contribute to the health and strength of our seamen.

That north-water I will not dignify by the term open Polar Sea; experience of former "open waters" warns me against doing so, though I pray that Kane's memory may hereafter be immortalised by the confirmation of his hopes and opinions. All I ask is now, explore it! A little whaler saw the road clear to it last August, as I have told. Inglefield saw no impenetrable barrier in his way for a steamer; at any rate, blocked or open, the north water is to be reached, if not in ship, with boat and sledge. M'Clintock computes that 40,000 miles of sea and land were explored in search of Franklin by boat and sledge, without the loss of one sledge or boat party. I only ask that as much be done in the cause of science and for the sake of our navy as was done from motives of humanity, to try and save the only explorers who have perished during a century in those regions.

Much has been made of the peril incurred, much of the loss of Franklin and his 100 followers, alas! I fear for a purpose. I remember the sheaves of gallant men I have seen laid in their narrow graves in feverish China; I know of the thousands thrown to the sharks of the Gulf of Guinea, in order that political capital might be made of such services at home. I saw more stout men struck down by yellow fever during a few weeks we were connected with that Stock-jobbing concern called the Anglo-French Mexican Expedition than ever perished during twenty years of Arctic service. And are you going to tell me that after that, when the State needs it, you would hesitate to-day more than yesterday to risk us? Then as to expense, all I say is, it has been grossly exaggerated. I may tell this Society—in strict confidence, or you will get me into a terrible scrape—that a screw two-decker was built all the quicker and all the cheaper at Woolwich Dockyard because such a windfall as the Arctic Expedition of 1850-52 happened to fall in. It is a great mystery. I dare not explain it to you. Dismiss, therefore, any fears about expense and risk. Let us combine and be earnest. Official opposition, if it exist, like the maids of Ismail, waits only for proper pressure: it will be coy, perhaps frown, but will yield nevertheless. The sums voted for the navy, from the last Government Arctic expedition in 1855, for the following ten years—say from 1854 to 1864—was *only* 115 millions sterling. And how much do you suppose out of those 115 millions were spent in the cause of science? Just 686,000*l.*, or less than the one hundred and sixty-fourth part of our naval vote. This includes, remember, the maintenance of the Royal Observatory at Greenwich, and the prosecution of surveys throughout the world. 686,000*l.* out of 150,000,000*l.*! Is it not but as Falstaff's "one halfpennyworth of bread to this intolerable quantity of sack"? and am I to be written down as wicked as Oliver Twist for asking for more?

I will not detain you longer. In my previous paper, which I have reprinted for distribution, you will find the way described in which to carry out this great work of Polar exploration. I have little to add—nothing to take from it; and I only ask this Society to give its President and Council a unanimous vote in favour of the resumption of Arctic expeditions, under Government auspices and encouragement. Sir Roderick Murchison will, as he has ever done, stand stedfast to his colours as the great promoter of geographical adventure, and friend of every earnest and faithful traveller; and with your unanimous vote and active support we, who are of the Committee of the British Association appointed for the furtherance of Polar research, shall be able, I doubt not, to convince the public, as well as our Admiralty, of the wisdom of our completing geographical exploration, and our old flag again wave ere long in frozen seas.

The PRESIDENT said Captain Sherard Osborn had given a very lucid, broad, and fair view of the probabilities and desirabilities of Arctic exploration. He had advocated the subject with the true-hearted feelings of a sailor; not, as it was stated in some of the newspapers, with a view to his own employment, but with a view to the glory of the British navy and to the education of our naval men, for the approaching expedition to Antarctic regions, to observe the transit of Venus over the sun. Nineteen-twentieths of the discoveries made in the Arctic regions were due to British exploration, and it would be a blot on their escutcheon if they did not maintain the lead in extending our knowledge of the Arctic regions. The proposal to send an expedition by the route between Spitzbergen and Nova Zembla, as advocated by M. Petermann, did great honour to the German nation. Let the Germans do all they could; and it was desirable that the French, who proposed to reach the Pole by Behring's Straits, should succeed in their efforts to organise an expedition; but let not the British navy be behind in these great enterprises. He had received a letter upon this subject from M. Petermann, which he would read, as he thought it was due to that gentleman that he should have the credit of having pointed out, long ago, the existence of a large extent of land near the North Pole:—

"MY DEAR SIR RODERICK, "Gotha, 7th February, 1868.

"Our expedition is to be ready to sail at latest by the beginning of May, 1869. Meanwhile a depôt of coals is to be formed in Spitzbergen, by directly sending there a shipload of coals as soon as possible in the course of *this* year. A small reconnoitring expedition like that of Lamont, Lord Dufferin, Newton, Birkbeck, and others, is also, if possible, in the course of *this summer*, to proceed to lat. 75° on the *eastern coast of Greenland*, the farthest point attained there, and thence to push on northwards along the coast in the footsteps of General Sabine's and Captain Clavering's expedition. I consider this part of the Arctic work as one of the main points remaining to be settled there. The weather and temperatures that expedition experienced from the 1st of August to the middle of September, 1823, must strike every one as remarkably favourable and inviting to explorers, compared with other Arctic regions in the same or even lower latitudes.

"The reconnoitring party to Eastern Greenland will very likely be headed by Lieut. Karl Weyprecht, of the Imperial Austrian navy, an experienced and most excellent officer in every respect, who for several years has devoted his attention to the Arctic question, and who yesterday came to see me, about the undertaking, all the way from Pola in the Adriatic. I wrote further in detail about Eastern Greenland to General Sabine on the 18th December.

"Regarding the recent discoveries of Captain Long and other American whaling captains, I beg to draw your attention to the fact that the high and extended land in 73° 30′ N. lat. and 180° long., as discovered by Long, *exactly coincides* (auf ein Haar) with the land I have for many years laid down and stuck to in all my maps. I enclose a copy of my last map, where you can see for yourself, I have stuck to the land in spite of all that was brought against it. You are aware that it was reported on for upwards of 200 years: first by Michajlo Stadurtius in 1645, who then founded the Russian settlement of Nishne-Kolymsk, then by Andrejen and a host of others. But Baron Wrangel did everything to throw discredit upon it, simply because he did not attain it himself. Kellett in 1849 discovered Herald Island and saw the land, but Captain Rodgers in the U.S. ship *Vincennes*, from his exploration in 1855, maintained that the land thus seen and Plover Island laid down by Kellett had no existence.

"I always, however, stuck to it, and perhaps you will kindly do me the favour and give me the credit of the corroboration of the correctness of my Arctic views regarding the Arctic Central Land thus far, in your opening remarks on

Monday, for which purpose I beg to offer you the free use of the whole of the foregoing remarks.

"I have the honour to remain, my dear Sir Roderick,
"Your most faithful and obliged servant,
"A. PETERMANN."

He had also received a letter from his Excellency Admiral Lütke, a circumnavigator of the globe himself, and President of the Imperial Academy of Sciences at St. Petersburg, who was exceedingly interested in this question:—

"The land which the whalers have seen and coasted recently to the north of Behring's Strait, must be that which, according to Wrangel, is perceived sometimes from Cape Yakan. It certainly does not belong to the continent of Asia, because Dechneff and others were able to pass from the mouths of the Kolyma to Behring's Straits in navigating along the Siberian coast. This land to which one of the whaling captains (I think Long) has applied the name of Wrangel, is therefore an island or group of islands like New Siberia (Nouvelle Sibérie). There is no reason why these lands may not extend to Greenland, which perhaps they may touch. It is much to be desired that some of the whale-ships which have steam-power might continue an investigation which, commenced accidentally, might tend in a great measure to settle the question; but until we see a little more clearly, I do not think it would be prudent to send a great expedition *ad hoc* with the object of penetrating in that direction into the Polar Basin or into the 'Polynia' of the Russians, as it has been the custom to name it.

"This idea, which has been much agitated in France, but of which we have heard less of late, appears to me to be the least practical of all the schemes. You know already how we Russians view this subject. We think that the route between Spitzbergen and Nova Zembla would offer the best chance of success. We stick to it as much as Sherard Osborn does to his route by Smith's Sound. But no matter which line be taken, *provided something be done.* Science will be sure to gain by it, and I see with sincere pleasure that you are beginning to rekindle the question.

"*Apropos* to the term 'Polynia,' there has been a singular misconception in the adoption of it to indicate an open sea round the Pole. Polynia (in Russian) means a hole in the ice more or less large, and rather small than large. It is often employed by Wrangel, because he frequently met with holes in the ice which naturally became more and more numerous as he approached the band of stagnant ice which flanked the coast, and consequently the open sea. But he never intended by Polynia to speak of the sea itself. It has thus happened, that to name one thing, a term has been taken from a foreign language which means quite another thing. Has geographical literature a logic of its own? But custom, like fashion, is a despot with whom we cannot reason; and, after all, what's in a name?"

Admiral OMMANNEY said he concurred generally in the views put forward by Captain Sherard Osborn; but he could not agree with him that all hopes of getting to the Pole by the Spitzbergen route were in vain. He was still in favour of a Spitzbergen expedition, and he was glad to hear that M. Petermann still advocated it. It was a route attended with the least danger of all. As a base of operations they had a harbour in the extreme north, where they might form a safe depôt, and remain on the watch for an opportunity to enter the ice without much risk; and they would always have open-sea communication with the Thames without much difficulty. The failure of Parry's attempt ought not to deter them; Parry had no orders to winter there, and when he left he much regretted having to come away at that season, because he believed he might have penetrated almost to the pole itself from the small amount of ice that was seen in that direction. It must be borne in mind that Parry quitted the Polar Sea at the most opportune time for advancing with steam-vessels of the present day. The proper way to explore by the Spitzbergen route was to winter there, and choose our opportunity. At the same time, he should be glad to see Captain Osborn's plan put in operation. But he would prefer making Spitzbergen the base of operations, as being more accessible from this country. The advantages of carrying the resources of a ship with you in searching the Polar region, with a view to obtain scientific observations, would infinitely surpass those you could command by sledge journeys. From what he had heard from officers who served with Parry on his Spitzbergen voyage, he believed that from our more recent Arctic experience, and the appliance of steam-power to the improved form of vessels, we could penetrate the icy seas towards the Pole. Therefore he was decidedly in favour of making the attempt with ships from Spitzbergen.

Admiral Sir GEORGE BACK said he gave his opinions upon this subject very fully three years ago, and in what he had to say now he could do little more than repeat himself. He was almost convinced, from having himself been at Spitzbergen, that it would be very difficult, if not impossible, to find a passage between Spitzbergen and Greenland. The ship commanded by Franklin, then Lieutenant, in which he was himself a midshipman, reached as far as 80° 36′ N., and was much damaged, her consort being almost broken to pieces; every opening along the edge of the ice was sedulously searched, but they found it impossible to make any progress northward; nor could they approach by any possible means the land of Greenland. On the other hand, he thought the passage between Spitzbergen and Nova Zembla theoretically had many advantages, and ought to be tried. On the whole, he leaned to the route proposed by Captain Sherard Osborn. The passage by Smith's Sound was practicable: an expedition could hold by the land, and when the open water was found they could have recourse to boats and sledges, and could always return. He much feared, however, that the proposal would not be adopted by the Government, with a "southerly wind" in the exchequer; nevertheless, he hoped that polar exploration at some future day might be in the ascendant, and that England would acquit herself as she ought, by accomplishing the very little that remained to be done in the Arctic circle.

Captain RICHARDS (Hydrographer to the Admiralty) quite agreed with Captain Sherard Osborn, that the best way to reach the North Pole was by taking ships as far up Smith's Sound as possible, and performing the remainder of the journey by sledges and boats. It was the only safe and certain route—safe, because in the event of disaster, there would be no difficulty in the crews reaching the Danish settlements in Greenland; certain, in as far as anything could be regarded certain, because greater distances had already been accomplished with similar means. But if it was desired to *explore the Polar basin*, then he should prefer the route by Spitzbergen, which would be more exclusively a ship expedition. One fact of great importance in connection with the proposed exploration, was that in 1882 would occur the transit of Venus over the sun's disc. This phenomenon involved the great question of the measurement between the sun and the earth, which was not at present accurately determined within a million or so of miles. The subject was of the greatest interest to astronomers; the Astronomer Royal, ten years ago, spoke of it as "the noblest problem to be solved in astronomical science." To measure the dimensions of the earth, or its distance from the moon, was an easy task; but to measure the distance of the earth from the sun required all the care and accuracy, all the skill, ingenuity, and knowledge which science could supply, and which man could bring to bear upon it; at the same time it was an opportunity which occurred very rarely. After 1882 the chance of solving this noble problem would not occur again for 130 years. He could not believe this country would allow such an opportunity to pass, or permit any other country to carry out this great undertaking, without taking a leading part in it. The necessity for making the needful preparations was the strongest argument which could be used in favour of an Arctic expedition at the present time, that is to say, it would enable our officers and men to gain experience in ice-navigation. There were very few Arctic men of the present generation who would be qualified in seven or eight years' time to encounter an Antartic voyage; but there were two or three still remaining, who were well fitted to educate another generation of naval officers for this service; and in these days, when so much was heard about education, he hoped this branch of it would not be forgotten. The trip to the North Pole by Smith's Sound would be an easy matter; afterwards, he should like to see the Spitzbergen route attempted, with a couple of steamers, fitted out in England, and commanded by such men as went out in the last expedition; and then they would come back ready for this Antarctic cruise. He was not quite so unselfish as Captain Osborn, in consenting that the Germans and the French should commence the work; he thought our twenty years of labour entitled us to take the lead, and he believed we should.

Staff-Commander DAVIS, who accompanied Sir James Ross in the Antarctic expedition, said he did not exactly coincide with Captain Sherard Osborn in wishing to throw over the route between Nova Zembla and Spitzbergen. Captain Osborn's objection to that route rested upon the great masses of ice seen by the Swedish *savans* from Spitzbergen. There was no doubt that the ice in travelling south must impinge upon Spitzbergen, and must be seen in that direction. But when we looked at the vast space of open sea between Spitzbergen and Nova Zembla, where of course there would be masses of ice coming south, he quite agreed with M. Petermann that if two good steamers were boldly to attack the pack in that direction, they would eventually get through a heavy stream of ice coming from the North Pole, and when once through, enter comparatively clear sea until they came to the fixed ice around the Pole, beyond which they could not advance. Taking Captain Osborn's scheme by Smith's Sound as a school for Arctic navigators, he approved of it above everything; it would be a first-rate school. At the same time, he thought Captain Osborn had miscalculated the time and the distance it would take to get from Cape Parry to the North Pole by sledge or boat. In Arctic travel they could not go straight ahead as the crow flies; they must follow the windings of the shore, which must greatly increase the distance, and lessen the chance of getting to the Pole. For the purpose of serving as a school he should like to see the plan attempted, in order to train men for the Antarctic zone; for, speaking from experience, he knew they would have no trifling difficulties to encounter.

Dr. MANN, as an astronomer, spoke in support of the remarks that had fallen from Captain Richards with reference to an expedition to the Antarctic regions to observe the transit of Venus in 1882. It was an opportunity which immediately connected the action of the astronomer with that of the geographer. In dealing with the distance of the sun, the investigator was just crossing the threshold where the easily-handled dimensions of the earth pass into star-distances and star-immensity; where, in short, geography becomes astronomy. The nearer moon was now almost a province of the earth. Such geographers present as were not astronomers might not, perhaps, be aware that the exactness of our knowledge of the distance of the sun—the first step virtually in our astronomical knowledge of the infinite—was in the main dependent on the range we could command in making the investigation. In expanding our possible terrestrial base of observation by a few miles, in so crucial a matter as this of the rarely occurring transit of Venus, we are really securing the chance of much more precise and reliable value for our prime unit of celestial measures. Hence the importance of geographers co-operating with astronomers in this interesting work. The transit of Venus affords a very remarkable instance of the interdependence of the different sciences. It was important to astronomy that observers should have a larger base for the observation of the transit of Venus: Captain Cook is sent to the Pacific, and geography is benefited by the discovery of the South Sea Islands. Geographers extend the stations of observation by terrestrial discovery, and a more exact knowledge of celestial distances is conferred upon astronomers from the enlargement of their base of action.

Mr. J. **Crawfurd**, speaking as a landsman who possessed hardly any knowledge of the subject, said he preferred Osborn to Petermann. Petermann was a landsman like himself: Osborn was a first-rate sailor, and had a vast deal of experience. Allusion had been made to the probability of the proposed exploration receiving no support from the Government. But the transit of Venus was an occurrence which they could not pass over. It was the transit of Venus which led to the great discoveries of Captain James Cook, now about 100 years ago; and he believed similar results would follow on this next occasion.

Captain **Sherard Osborn**, in reply, said he had no opposition to meet except the argument which Commander Davis had put forward, the truth of which he acknowledged to some extent, but he could undertake to remove Captain Davis's doubts over the figures if time admitted. With respect to Captain Richards' remarks, the necessity of training men for the Antarctic cruise some years hence had not escaped his attention. His experience of Arctic exploration had taught him that there was always as good fish in the sea as ever came out of it. He had sufficient faith in his profession to believe that if we were to shut up the Arctic book, within a century it would be opened again: that fresh men would start to the fore, and Arctic exploration would be persevered in by this country till there was nothing further to be known of those regions. At this moment he did not think there was a single Arctic officer fit to go in command of such a party, and do the work he had pointed out up Smith's Sound. The few Arctic officers that remained were not equal to the exposure entailed by sledge travelling. They could command ships a few years longer on Spitzbergen expeditions; but we must have faith in younger men, and trust to them to carry on the work he wished to see undertaken by way of Smith's Sound.

Captain **Allen Young**, who was associated with Sir Leopold McClintock in the search for Franklin, said the question had often been asked, What is the use of Arctic exploration? They had only to point to the west coast of Greenland for an answer, where there were flourishing Danish colonies, which produced 200,000 dollars annually, employed 15 ships, and had churches as far north as 72° N. This was one of the fruits of Arctic exploration. Another was the large fleet of whalers which annually left Dundee and Peterhead, and sailed round Baffin's Bay and the east coast of Greenland. He held in his hand a letter from Captain David Gray (which he read), to show what private enterprise would do. This gentleman had purchased and fitted a new steamer, at an expense of 25,000*l.*, and was going out this month on a scientific, combined with a whaling expedition. He would sail from Peterhead on the 25th of February, and, among other objects, proposed to ascend the east coast of Greenland as far as 80°, and might be the means of ascertaining if the Pole could not be reached in that direction. Captain Young said he agreed with Captain Osborn with regard to making the exploration by land, as far as it was practicable. In conclusion he remarked that the journals of Franklin must be in existence somewhere. No doubt when the ships were abandoned the journals were deposited in a place of safety near the Great Fish River. It only remained to search for them when the snow was off the ground.

The PRESIDENT, in closing the discussion, said the last meeting was honoured with the presence of the Lords of the Admiralty. He only wished that their lordships had been present on this occasion also, to have heard from Captain Sherard Osborn, Captain Richards, and other officers of the navy, the cogent reasons they had given for the employment of British sailors in this most important research. He hoped, upon consideration and reflection, that the day would arrive when a small portion of the British navy would be so employed.

Seventh Meeting, February 24th, 1868.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Capt. Edward Baynton; Nathaniel Cork, Esq.; William R. Dalziel, Esq.; Alfred Gillett, Esq.; David Haysman, Esq.; Henry Kingsley, Esq.; Richard L. Middleton Kitto, Esq.; John William Miers, Esq.; M. Lucas Mavrogordato; James E. Coulthurst Pryce, Esq.; the Hon. Edward Stirling; John William Shaw Willie, Esq.*

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING, FEBRUARY 10TH.—Churi: 'Sea, Nile, and Nigritia,' 1853. Cortambert and Léon de Rosny: 'Tableau de Cochin-China,' Paris, 1862. Barr: 'Cabul and the Punjab,' 1844. Vigne: 'Visit to Ghuz,' 1840. Martin: 'Hudson's Bay Territories, 1849.' 'Uhde Lander und unteren Rio Bravo del Norte,' Heidelberg, 1861. Le Page: 'Travels round the World.' Captain Wilson: 'First Missionary Voyage to South Sea Islands, 1797.' Presented by E. G. Ravenstein, Esq. 'Asia: João de Barros e Diogo de Couto,' &c., Lisboa, 1778. Donor, Captain Constable. 'Authorship of the Practical Electric Telegraph of Great Britain,' &c. Edited by the Rev. Thomas Fothergill Cooke, Donor. 'Lake Victoria: a Narrative of Explorations in Search of the Source of the Nile;' compiled from the Memoirs of Speke and Grant, by G. C. Swayne. Donors, the Publishers. 'An Enquiry into the Primeval State of Europe.' Presented by the President. Gottsche, C. M.: 'De Mexikauske Levermosser;' and other papers in the Danish 'Videnskabernes selskabs Skrifter,' Copenhagen, 1867. 'Journal of Travel and Natural History,' edited by Andrew Murray, Esq. Purchased. Le Comte: 'Nouveaux Mémoires sur l'Etat present de la Chine,' 3 vols., Paris, 1697.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING, FEBRUARY 10TH—Three sheets of the Governmental Map of Bavaria, viz.:—Sheet No. 13, Lichtenfels; No. 108, Zweybrücken; No. 109, Pirmasens. Presented by the Bavarian Government. China: Map of the Province of Kwang-tung, by an Italian Missionary; on 2 sheets. Presented by J. L. Southey, Esq., of Hong-kong. Map of the Arctic and Antarctic Regions. Projected and presented by Dr. A. Petermann. Map of Abyssinia, showing the progress of the British Army. Presented by Dr. A. Petermann.

The following Papers were read:—

1. *Geographical Results of the Abyssinian Expedition.* No. 1.
2. *Geographical Results of the Abyssinian Expedition.* No. 2.

By C. R. MARKHAM, Esq., Secretary R.G.S.

IN these papers Mr. Markham communicated to the Society the Geographical results of the Abyssinian Expedition down to January 22nd, 1868. Commencing with a description of the shores of Annesley Bay, he stated that the ancient Greek city of Adulis, the emporium of Greek trade in the time of the Ptolemies, formerly stood close to the shore; but the ruins were now at a distance of four miles. On a few mounds, concealed by salicornia-bushes, there have been found broken pieces of fluted columns, capitals, and other fragments. But a great wealth of antiquarian treasure may be concealed under the mounds; and Dr. Lumsdaine, after making a very slight excavation, found the bronze balance and chain of a pair of scales,—an appropriate first discovery in the ruins of a great commercial city. The Shohos, who inhabit the plain, are a black race, with rather woolly hair and small-boned; but with regular, and, in some instances, even handsome features. They wear a cotton cloth round the middle, and a cloak of the same material, the head and feet bare, and are always armed with a curved sword, worn on the right side, spear, club, and leathern shield. They have cattle of a very diminutive breed, asses, goats, and sheep. Their mode of sepulture is peculiar; the graves are marked by oblong heaps of stones, with an upright slab at each end. A hole is dug about 6 feet deep, at the bottom of which a small cave is excavated for the reception of the body. The tomb is then closed with stones, and the hole leading to it is filled up. The reconnoitering party, under General Merewether, Colonel Phayre, and Colonel Wilkins, made extensive explorations of the approaches to the Abyssinian highlands in the months of October, November and December. At the head of Annesley Bay an extinct volcano was observed, with a double crater 100 feet deep and 300 feet across; and scoria and pumice were seen scattered over the plain. Beyond Arafali extends a plain, where ostriches and antelopes were met with. Travelling southwards, the River Ragolay was reached, 49 miles distant from the sea; and the northern limit of the great salt plain, east of the Abyssinian highlands, was traced. It was discovered that the eastern drainage of the whole of the Abyssinian plateau from Senafé to Atsbi, which are 70 miles apart, consisted of tributaries of the Ragolay. At the point reached the river was a perennial running stream, in spite of thirsty sand and scorching sun. Afterwards in flowing towards the sea it descends into a depression 193 feet below the sea-level, which was probably caused by some volcanic action, and its waters are finally dissipated by evaporation. Opportunities would be taken, during the march of the field force along the watershed from Senafé to Atsbi, of completing the examination of the tributaries of the Ragolay to the eastward; and possibly, if any of the ravines through which they flow afford tolerable roads, it may be deemed advisable to open another line of communication by the Ragolay to the sea at Howakil Bay. The author travelled up the Senafé Pass, with Sir Charles Staveley and his staff, between the 20th and 22nd of December. The road enters the pass immediately on leaving Komayli, and winds up the dry bed of the Nebhaguddy. In several places the alluvial deposit brought down by the torrent was from 10 to even 20 feet thick. The pass winds much and is narrow, while the gneiss-mountains rise up perpendicularly on either side. Near Sonakte the gneiss ceases; and a dark schistose metamorphic rock, with strata thrown up at angles of upwards of 70 degrees, takes its place, apparently overlying it. It was observable that, whenever there was running water, the strata were nearly horizontal, or but slightly tilted, while the waterless tracts were those in which the strata were tilted at great angles. Further on the scenery becomes very fine, the cliffs higher, with peaked mountains towering up behind them, and the vegetation richer and more varied. Very fine trees of the fig tribe, peepul, banyan, and sycamore-figs, grow in this part of the gorge, with the feathery tamarix, tamarinds, jujub-trees, and an undergrowth of mimosa, lobelia, and solanum. The author climbed to the top of a hill above Raraguddy, and obtained a splendid view. To the south and west extended the edge of the Abyssinian table-land; running in almost a straight line, with scarped sides of white sandstone. The mountain-ridges or spurs, between which the passes wind, appeared to run off from the table-land at right angles, but afterwards turning to the north and throwing up peaks here and there. Observations for altitude and for latitude were taken at all the principal halting-places. Mr. Markham stated that he had been in the Alps and Pyrenees, had walked or ridden up nearly every pass in the Western Ghauts of

India, from Bombay to Cape Comorin, and knew most of the passes in the Peruvian Andes; and could confidently affirm that in none of these ranges was there any natural opening so easily accessible as that from Komayli to the highlands of Abyssinia. On an examination of the area of drainage of the torrents which flow down these passes, Mr. Markham believed that the danger of floods in the rainy season was not so great as had been supposed. Advantage had since been taken of the delay at Senafé to explore a great part of the neighbourhood, a description of the natural features of which was given in the second paper. The table-land lay at a general altitude of 8000 feet above the sea, and was diversified by valleys, ridges of hills, and peaks; some of which—as Mount Sowayra, ascended by the author—proved to be 9100 feet in height. The geological formation is sandstone, resting unconformably on the same highly-tilted strata as visible in the pass. One of the most interesting points is the character of the vegetation as varying with the elevation; the plants and trees forming successive zones of differing character in ascending from the plains to the mountain-summits. On the summit and slopes of Mount Sowayra (9100 feet) the *flora* is of a thoroughly temperate and even English character. The only tree is the juniper, while the most common plants are lavender, wild thyme, dog-rose, violets, cowslips, and various *compositæ*. The sandstone plateaux have a similar *flora*, but on the lower slopes of the hills bounding the valleys it is enriched by many trees and shrubs of a warmer clime. Italian here mingles with English vegetation. In the lovely gorge of Baraka, on the western side of the Mai Mena Valley, masses of maiden-hair fern droop over the clear pools of water, and the undergrowth consists of a *Myrsine*, a large lobelia, and solanum. At this elevation a vegetation akin to that of the Bombay Ghauts commences. In the Hamas Gorge (5850 feet) there is nothing but acacias and mimosæ. The open valleys, as a rule, are bare of trees. The temperate flora extends over a zone from 9000 to 6000 feet, the sub-tropical from 6000 to 3000, and the dry tropical coast-vegetation from 3000 feet to the sea.

These papers will be printed entire in the Journal, vol. xxxviii.

The PRESIDENT, in expressing the thanks of the Society to Mr. Markham, said the descriptions which he had given of the successive zones of vegetation forcibly reminded him of some of the admirable generalisations of Humboldt. There was scarcely any point connected with the physical geography of the region which had escaped Mr. Markham's attention. He had also communicated some interesting observations on the geological structure of the country. The different altitudes of the table-lands and peaks had been observed and recorded, besides observations for latitude and compass variation. He had sincere pleasure in testifying to Mr. Markham's zealous efforts in former years, in various parts of the world, to work out any problems in geography that engaged his attention. He had twice visited the Peruvian Andes, and had described large portions of that region; in his second journey having accomplished the remarkable work of conveying the cinchona-plant from Peru, and planting it in different parts of India. These services had obtained for Mr. Markham distinction wherever they were known; and he was proud to mention that at the Athenæum Club, where they were in the habit every year of electing nine men eminent in science, letters, and arts, Mr. Markham had the honour of being among the first three that were elected in this season. Seeing the Secretary of State for India present, he might add that, Sir Stafford Northcote had consented to part with Mr. Markham's services at the India Office, where he was most highly esteemed, in order that he might be appointed on his, the President's, recommendation, Geographer to the Abyssinian expedition.

Sir **STAFFORD NORTHCOTE, M.P.**, said, shortly before Mr. Markham was called away he had been promoted to a post of considerable importance and difficulty in the Indian Office, with a view to special services; and he confessed it was not without considerable reluctance that the Council of India assented to his being taken away to engage in another sphere of labour. Mr. Markham had gained a great reputation, considering his years, for the services he had rendered to humanity, more especially with reference to the introduction of the cinchona-plant into India, for which he had received the *grande médaille d'or* at the recent Paris Exhibition. The paper to which they had been listening fully bore out his reputation. It was one consolation, under the melancholy necessity of this expedition, that it gave us the opportunity of promoting the objects of science, incidentally, and he believed that many useful results would be attained. He understood that the season had been an exceptional one in Abyssinia. It had been a season of peculiar drought; and there had, consequently, been great difficulty in obtaining water and forage. The country had also been afflicted with an unusual visitation of locusts, and a great deal of the barley and other crops, upon which the troops reckoned in their advance, had been destroyed. The necessity of having to send a much larger quantity of supplies from the sea-coast to Senafé had delayed the advance of our troops, and would necessarily add to the cost of the expedition. Still this circumstance had not been unattended with advantages; it had enabled us to impress upon some of the native chiefs and their representatives an idea of our skill and power, in being able to turn the sea into drinking-water, and to draw water from the earth by means of Mr. Norton's admirable American pump. The first attempt to penetrate the country was made by the Takoonda Pass, to the westward of Senafé, which is the one best known, but it was found a difficult pass on account of the scarcity of water. The system of ready payment which we adopted had gained the confidence of the natives, and abundant supplies were now pouring in from a considerable distance. The cry of the butter-women and the milk-women was to be heard in the camp; and the inhabitants were most friendlily disposed towards us. Their good-will would prove most valuable to us in the advance of the expedition southward.

Dr. **BEKE** said, with reference to the ruins mentioned by Mr. Markham as having been discovered near Senafé, that Senafé was no doubt the representative of an ancient Greek town, which existed in its neighbourhood, just as Zulla was the representative of the ancient Adulis, although it was some distance on the opposite side of the Haddas. He could not help thinking that Senafé was a corruption of the ancient Greek name. Abyssinia was full of places bearing corrupted Greek names. There was one point connected with physical geography which he might touch upon: it was with regard to the depression of the salt lakes. As long ago as Christmas-day, 1840, when travelling between Tajurra and Shoa, he examined Lake Assal, and estimated its depression below the sea-level at 760 feet. The salt-plain of northern Abyssinia had now been found to be in like manner below the sea-level. He had always held the opinion that this lake-basin was formerly an arm of the sea, which had been cut off by the land now intervening, and that the water had since evaporated, leaving the salt in a rough solid form. The water-parting of the Abyssinian table-land was very remarkable; for it lay along its eastern edge, not far from the Red Sea; so that near Halai, within view of this sea, the waters diverged, on one side flowing into the Mediterranean, by way of the Nile, and thence running into the Atlantic, and on the other side flowing into the Red Sea, which joins the Indian and Pacific Oceans. When travelling along this water-parting, further south, in company with his friend Dr. Krapf, he remembered throwing sticks into the streams running right and left as they went along, and saying that those sticks would never meet again, unless they went round the Cape of Good Hope or Cape Horn.

Sir **SAMUEL BAKER** said his personal experience of Abyssinia was confined to the north-western slopes of its table-lands, where he had spent many months, and had penetrated, in the course of his hunting excursions, into the ravines which occur every few miles in the chain of mountains. The description that had been given by Mr. Markham was most interesting to him. It was clear that in advancing southwards from Senafé our troops would have to cross every one of the tributaries of the Nile running from the watershed of Abyssinia. Up to the present time Mr. Markham had had but a short acquaintance with the country; but he would find, as he gained more experience, that our troops are in one of the finest countries in the world. He had himself discovered that the whole of the northern and western sides of this country, which had only been passed through in a direct line by Mr. Mansfield Parkyns, and by Bruce 90 years ago, might be made one of the finest cotton producing countries in the world. He found that, although far distant from the port of Suakim, which was the natural outlet (not Massowah), that the price of transport by camels was simply four shillings per cwt., or a little less than one halfpenny per pound. Therefore, although people in England might imagine the distance from our market would be too great for cotton to be grown profitably, he could assure them that if there were only a stable government established, the region in question would be one of the greatest cotton-growing countries in the world. Coming to Abyssinia proper, he had noticed the same geological structure in the north-west which Mr. Markham found at Senafé. It consisted of sandstone lying upon schistous rock, but as he approached the mountains he found that basalt had forced its way apparently through the sandstone, and formed the elevated peaks of the great chain of mountains rising abruptly to a height of from 8000 to 12,000 feet. The face of the mountain range on the northern side formed a nearly perpendicular wall. The reason of this was obvious. After the heavy rainfalls, a tremendous rush of water poured down upon that side, which had entirely altered the form of that portion of the country. Instead of being a gradual ascent and descent, as it was on the other side, between Senafé and the sea-coast, it was found to be perfectly precipitous; the great floods had carried away the whole of the earth, and that earth now formed the delta of the Nile at Alexandria. With regard to the captives, the question now was, should we be able to reach Magdala before the rainy season set in? Up to the present time, taking into consideration the enormous difficulties of the country, there could not have been fewer mistakes made. But he felt perfectly convinced that it would be impossible for our army to reach Magdala and to finish the war before the rains. Few people could appreciate what these rains meant until they had seen an Abyssinian rainy season. When those rains began there was a total cessation of travelling; and with the young grass, unfortunately, a fatal cattle epidemic appeared. These were things which no general could combat against. If the captives should still be at Magdala whilst we were at Adigraht, the difficulty would be this, that when the King found himself hemmed in by the advancing forces of Sir Robert Napier, he would most likely kill the captives, or retreat with them into the mountains, and hold them as hostages, so as to force Sir Robert Napier to agree to his own terms; or should Sir Robert Napier refuse to sign such an agreement, then the war would be carried on *ad infinitum*. Or supposing we caught Theodore, and obtained the release of the captives, the question would be, "What shall we do with Abyssinia?" It was proved to be a most healthy country, it was a cotton and coffee-growing country, it had good ports on the Red Sea, and it was on the high road to India. Most people dreaded annexations ; but he had a firm conviction, that after having spent 10,000,000*l*., and having conquered Abyssinia, if we should retire from that country, the natives of India would say that we had been driven out: we should, therefore, lose our reputation, to preserve which had been the object of the war. He had, therefore, come to the conclusion that the English ought to remain where they were, and retain possession of the country.

The **PRESIDENT** remarked that Sir Samuel Baker, who in the earlier part of his observations had very effectively expatiated on the geographical features of North-western Abyssinia, had ultimately drifted into political questions which were well suited to the House of Commons, but wholly out of the province of this Society. He must recall his attention to matters of geography. He (the President) held in his hand a new map of Eastern Abyssinia, which he had received that morning from Dr. Petermann, of Gotha, and which contained all the geographical information obtained up to the present time by our expedition. It was a remarkable instance of rapid execution in cartography, the official map containing the new information having only been issued by the Topographical Department of our War Office a fortnight previously. Our own authorities and the public were much indebted to Colonel Cooke, of the Topographical Department, for the ability and promptitude with which he incorporated the new information into the official map of Abyssinia. He also held in his hand a series of most graphic sketches representing the features of the interior of Abyssinia, made by Mr. Essler, one of the captives who escaped. They now belonged to Bishop Gobat, and were about to be lithographed and published by Mr. Hotten of Piccadilly. He then called on Colonel Cooke to speak, and expressed a hope that, whoever might address the meeting, the speaker would confine himself to scientific matter.

Sir **HENRY RAWLINSON** said he was sorry Colonel Cooke was not present to give some of the results of his well-digested researches into Abyssinian geography. The Blue Book compiled by him was one of the most admirable digests that was ever put together. It must be invaluable to the officers engaged in the expedition. In alluding to this work he wished to draw attention not merely to the geography of the country which our troops had passed over, but also to the geography of the country through which they would advance. Before the British troops had landed on the coast they were able, owing to the information that Colonel Cooke had collected, to indicate the route the army would have to march along, at least so far as to point out, as he had the honour of doing in that room three months ago, that Senafé would probably be the first post, Adigraht the next, and Antalo the third. With regard to the geography of the country further southward, they were able with the help of this book to anticipate day by day pretty nearly what would happen to our troops almost the whole way to Magdala. He disagreed with Sir Samuel Baker as to some of the difficulties which he foreshadowed. In the first place, the troops would not cross any of the streams; they would keep along the eastern edge of the table-lands, so as really to go round the head-waters of the streams, and consequently avoid the precipitous ravines which furrowed the country. It was the route which Dr. Krapf followed on his journey. Dr. Beke travelled from Antalo to Sokoto, and had to cross the river valleys, and in so doing got into more difficult country than he would have done if he had kept along the crest of the mountains. The most important point was, that the country between Adigraht and Antalo, which was the district about to be traversed by our troops, was really the easiest country in all Abyssinia. It consisted of a high plateau, and was so open that Lefebre and Krapf both mention that it was sometimes traversed by camels. It was important to know that we need not expect the same difficulties and the same delays that had occurred hitherto. The real difficulty and the real cause of delay was the ascent to the plateau from Annesley Bay. Once there, it was plain sailing all the way to Antalo. Nor was there any occasion for misgiving with regard to the rainy season. According to the accounts of all travellers, the rainy season need not stop operations in any way. The great Portuguese expedition took place during the rainy season, and the great battle which they fought with the Abyssinians was on the 15th of August, in the very midst of the rainy season. The prisoners had always stated that although there was rain for three or four months in the year, no unhealthiness accompanied the rain. But for the exception of getting a wet skin occasionally, there was no more inconvenience in marching in the rainy season than at any other time of the year. He should not follow Sir Samuel Baker into a discussion of the political part of the subject; but with regard to his "inevitable suggestion," he thought, looking at the point fairly and dispassionately, that there were stronger grounds against than in favour of annexation. We had given a pledge to the whole world that we did not contemplate territorial acquisition, and we were bound in honour and fairness to carry this out. At the same time he saw no valid objection to our retaining a footing on the coast, which did not belong to Abyssinia, not merely for purposes of commerce, but also of philanthropy, in view of the more effectual suppression of the slave-trade.

Sir STAFFORD NORTHCOTE said, after the two last speeches if he were to remain silent it might be supposed that he assented to the views they expressed. But he must be permitted to say that they did not represent the views of the Government. We had undertaken this expedition for one purpose, which was to rescue our fellow-men and our envoy from captivity; and when we had succeeded in that object our forces would be withdrawn, and no other consequences would follow.

Dr. BEKE wished to add, with respect to the rainy season, there was not a day during which there would not be several hours suitable for an army to march. Sir Henry Rawlinson had spoken quite truly in saying that the Portuguese campaign was carried on and their great battle fought during the rainy season; namely, on August 30th, 1542. In the year 1805, Mr. Salt left Arkiko, on the coast of the Red Sea, on July 18th, and arrived at Antalo, the Ras's residence, on August 18th. Thence he went to Adowa and Axum, returning to Antalo in time to be present, on September 26th, at a grand muster and review of the Ras's troops, who "had for several days past been assembling from all parts of that Prince's dominions;" and on October 10th he left Antalo on his return to the coast, which he reached in perfect health on November 7th. He believed the British army could march along the upper country every day of the year without exception.

Mr. CRAWFURD said he did not think the rainy season so dangerous and difficult as Sir Samuel Baker had represented. Moreover, the rainy season did not commence till June, consequently there were four months for the troops to march to Magdala, and they had already advanced one-fourth of the way. He was opposed to keeping possession of Abyssinia, and he could not agree with Sir Samuel Baker in thinking it could ever be made a cotton-producing country. The inhabitants of Abyssinia were barbarians, and no barbarians ever did produce cotton.

were at Adigraht, the difficulty would be this, that when the King found himself hemmed in by the advancing forces of Sir Robert Napier, he would most likely kill the captives, or retreat with them into the mountains, and hold them as hostages, so as to force Sir Robert Napier to agree to his own terms; or should Sir Robert Napier refuse to sign such an agreement, then the war would be carried on *ad infinitum*. Or supposing we caught Theodore, and obtained the release of the captives, the question would be, "What shall we do with Abyssinia?" It was proved to be a most healthy country, it was a cotton and coffee-growing country, it had good ports on the Red Sea, and it was on the high road to India. Most people dreaded annexations; but he had a firm conviction, that after having spent 10,000,000*l*., and having conquered Abyssinia, if we should retire from that country, the natives of India would say that we had been driven out: we should, therefore, lose our reputation, to preserve which had been the object of the war. He had, therefore, come to the conclusion that the English ought to remain where they were, and retain possession of the country.

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Eighth Meeting, 9th March, 1868.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*J. W. Miers, Esq.; George Bentley, Esq.; F. M. Metcalfe, Esq.*

ELECTIONS.—*C. Anstey, Esq.; G. Bentley, Esq.; W. Bull, Esq.; W. H. Cole, Esq.; Frederick Dutton, Esq.; R. G. E. Dalrymple, Esq.; Major Goldsworthy; Hugh Jamieson, Esq.; the Right Hon. the Earl of Kellie; W. H. Lane, Esq.*, B.A.; *Major G. D. Pritchard*, R.E.; *W. B. Watson, Esq.; W. C. Wentworth, Esq.*

ACCESSIONS TO THE LIBRARY FROM FEBRUARY 24TH TO MARCH 9TH.—'Grammar of the Coorg Language.' Bangalore, 1867. By Capt. R. A. Cole. Donor, the Author. 'Die Länder am untern Rio Bravo del Norte, von Uhde.' Heidelberg, 1861. 'Die Preussische Expedition nach Ost-Asien.' Purchased. 'Die ersten Aufnahmen der Englischen in Abessinien, Nov., 1867, bis Jan., 1868.' With two Maps. Donor, M. Aug. Petermann. 'Notice Historique sur le Monument erigé par la Ville de Paris aux Sources de la Seine, par M. Larribe.' Paris, 1868. Donor, the President. 'Report on the Vegetation of the Andaman Islands, by S. Kurz.' Donor, Mr. Thomas Anderson. 'Scenery and Studies of Savage Life.' By Gilbert M. Sproat. Donor, the Author. 'History and Migration of Cultivated Narcotic Plants in Reference to Ethnology.' By J. Crawfurd, Esq. Donor, the Author.

ACCESSIONS TO THE MAP-ROOM TO MARCH 9TH.—Map of the Kirghiz Steppe and the countries conterminous with the Central Asiatic Possessions in Russia. Presented by the War Office. A View of Magdala, from a sketch by Th. von Heuglin. Presented by the Topographical Office.

The PRESIDENT, before proceeding to the business of the evening, said, in consequence of repeated complaints from Fellows of the Society, of the difficulty of finding seats at the evening meetings, the Council had appointed a Committee to inquire into the subject; and as the result of their deliberations the following Resolution had been passed:—

RESOLVED:—"That the whole of the centre block of seats at Burlington House be exclusively reserved for members of the Society, and the first row of that block reserved for the Council, the two wings to be devoted to ladies and strangers, with the reservation of the two front rows of the wings for distinguished visitors, and ladies introduced by members of the Council. The rule that a member shall only introduce one lady or one friend to be strictly enforced. After the President has taken the Chair no seats whatever to be reserved."

The following Paper was read:—

On the Geography and Mountain Passes of British Columbia, in connection with an Overland Route. By ALFRED WADDINGTON, Esq.

THE author commenced by stating that the possibility of opening a direct and available line of communication between Canada and the Pacific Ocean, through British North America, had been for many years a subject of doubt. This was chiefly owing to our imperfect acquaintance with the geographical features of the country west of the Rocky Mountains. He had himself spent more than five years in various efforts to explore British Columbia with this view, and had equipped and sent out numerous exploring parties in all directions; the result was the discovery of a practicable route for a railroad through the Cascade Range and the survey and partial opening of 222 miles of road through a previously unknown country, between the coast and the mouth of the Quesnelle River, which must necessarily form the first link in any future overland route. British Columbia was to a great extent occupied by two ranges of mountains running N.N.W., but gradually diverging from each other as they advance towards the north, where they enclose a vast central plain. The main crest of the eastern range, or the Rocky Mountains, forms the eastern boundary of the colony, and comprises several peaks rising to the height of 16,000 feet; but these mountains in British Columbia are composed of three distinct chains, divided from each other by rivers and deep valleys. The middle range presents one uninterrupted line of mountains (some of them 12,000 feet high) for a distance of 240 miles. The travellers who have discovered the principal passes in the Rocky Mountains had been unable to push their explorations beyond the eastern or upper portion of the Columbia River, so that neither the middle range nor the western one had been hitherto examined. These were, however, carefully explored in 1867, and it was proved that no practicable pass existed through the middle chain. The western range rises from 4000 to 8000 feet in height, and south of Fort Shepherd it is composed of no less than eleven sharp and nearly parallel ridges. The only good pass from the Columbia River, through this third range, is in 50° 56′ N. lat., near the southern end of Soushwap Lake, and was discovered in 1867 by Mr. Moberly, the Government Engineer at Eagle Creek. There is, however, this important feature in the middle and western ranges, namely, they both become gradually lower north of Cariboo, and this depression forms a large tract of level country on the south side of the Upper Fraser, most suitable for the passage of a railroad through this difficult country. The average width of the Cascade or Coast Range is about 110 miles; it forms a sea of mountains, some of which reach an altitude of 10,000 feet. Near the boundary line this range throws out a spur east and north, so as nearly to connect it with the Rocky Mountains. It is over the formidable Alpine masses here grouped together that the present wagon-road lies towards Cariboo; and it has been pronounced by competent authorities that there is no reasonable way of getting over it with a railroad. After examining the various deep fiords along the coast north of Fraser River, the author had finally given the preference to Bute Inlet, as being by far the best starting-point for an overland route to Canada from the Pacific. Its advantages were: a better harbour, a passage through the Cascade Range by the river valley at its head, and its proximity to the best part of the great central plain before mentioned, across which the proposed road would pass to the Upper Fraser and the Leather Head Pass of the Rocky Mountains. The author had well explored the head of the inlet, and had surveyed the road through to the plain. The trail cuts through the Cascade Mountains by a deep valley, and rises imperceptibly for 84 miles to its maximum height of 2500 feet, and the communication is open throughout the winter. The valley of the Homathco River at the head of the inlet is 80 miles in length, and varies in width from three miles to less than a quarter of a mile. It is in general heavily timbered, but contains rich bottoms capable of producing any kind of crops. The central plain, at the point where it is crossed by the proposed road, is 120 miles wide, and has vast pasturages and park-like scenery. The Leather or Yellow Head Pass is preferable to any other through the Rocky Mountains, not only on account of its low altitude (3760 feet), but from its easy gradients and the superiority of its approaches both from the eastward and the westward. The author concluded with a few remarks on the urgency of a direct overland communication between Canada and the Pacific, through British territory. In a political point of view, and as a natural consequence of the late confederation, it would contribute essentially to its prosperity. At present England has no other communication with the Pacific but by New York and San Francisco; and the Red River Settlement remains isolated, midway between our Atlantic and Pacific Colonies.

The paper will be printed *in extenso* in the Journal, vol. xxxviii.

Mr. WADDINGTON made the following remarks in addition to his paper. He said that Mount Baker was an active volcano, and that Mr. Coleman, of Victoria, formerly a member of the Alpine Club, had twice attempted the ascent in company with Mr. R. Brown; once they were stopped by an Indian chief, and the second time, making the attempt by the northern side, they were arrested near the summit by immense cliffs of snow and ice. The eruptions of this mountain consisted of vapour and smoke, but no lava had yet been seen to come from it. About two years ago an eruption took place, simultaneously with the earthquake at San Francisco, and on that occasion one of two peaks which formed the summit partially fell in. With regard to the overland route which he proposed, he believed he had shown the practicability of opening such a communication between the eastern and western sides of the North American continent, in British territory. The distance from Montreal to the head of Bute Inlet was 3490 miles, while the distance between New York and San Francisco was 3300 miles. Out of these 3490 miles, 2400 would consist, according to his plan, of steam-boat navigation along the rivers and lakes. At the commencement there would be 442 miles of railroad from Montreal to Collingwood, the head of the Canadian railroad system on Georgian Bay, which connects with Lake Huron and Lake Superior, and on the other parts of the line there would be 648 miles of dray-road; of which, with the assistance of gentlemen in this country, he had engaged to make 222, that is, the section between the head of Bute Inlet and the mouth of the Quesnelle, a tributary of the Fraser River. The Canadian Government had engaged to make the road between Lake Superior and Fort Garry, the head of the Red River Settlement, excepting the 91½ miles between the Lake of the Woods and the Red River, which the authorities of the settlement had pledged themselves to open. Consequently there remained only 140 miles east of the Rocky Mountains, between Edmonton and the Yellow Head Pass to be provided for. The road would therefore consist of the following sections. Starting from Lake Superior, the first piece of road, 28 miles in length, to Dog Lake, was already begun by the Canadian Government. Then came 35 miles of navigation through Dog Lake and along a portion of Dog River. To this succeeded a portage of 5 miles; then 65 miles of navigation again, with another break of 66½ miles; then 208 miles of navigation along the Rainy River and through the Lake of the Woods to the end of Shoal Lake; after this there were 91½ miles of plain road from Shoal Lake to Fort Garry. From Fort Garry the route took a northerly direction down the Red River into Lake Winnipeg; up Lake Winnipeg; then along the Saskatchewan the whole way to near the foot of the Rocky Mountains for a distance of 1249 miles in one stretch, with the single break of the rapid, called the *Grande Rapide*, at the mouth of the Saskatchewan and Lake Winnipeg. Those 1249 miles could be made, at very slight expense, easily navigable by steam-boats. Touching the navigation of the Upper Saskatchewan in the autumn, when the waters are low, the general opinion—in which Sir James Douglas, former Governor of British Columbia, concurred—was that light steamers could run during the whole season, except when stopped by frost. With regard to the 140 miles between the Saskatchewan and the Rocky Mountains, it was a question whether this section should be opened by the Canadian Government or the Hudson's Bay Company; the Crown having declined to have anything to do with it. Then came the Upper Fraser, which formed a circuit round the Cariboo Mountains of 280 miles. The Upper Fraser was perfectly navigable for steamers; it was as quiet as the lower part was impetuous and rapid. From the mouth of the Quesnelle, where these 280 miles terminated, he proposed a line of railroad, 222 miles in length, which would take the route to Bute Inlet, where there was a good harbour and the easiest communication with Victoria. He had been down twice in a steamer in sixteen hours from Bute Inlet to Victoria. The entire communication could be opened at very small expense, and in a very short time. The Hudson's Bay Company had almost promised that they would put steamers on the Upper Fraser, if the scheme were carried out in British Columbia. On the Saskatchewan the question was still to be settled, because for the first two or three years the steamers would have to run for nothing; and some plan must be found of subsidizing them, either by grants of land or money. He had forgotten to mention that the distance from Collingwood to the north-west end of Lake Superior was 534 miles. With reference to the questioned advantage of opening this country, Mr. Waddington stated that the region traversed by the Saskatchewan, for a distance of 1250 miles, was remarkable for its fertility and good climate. He also pointed out the political and commercial importance of forming a connection between Canada and British Columbia, and of opening a road to the Red River Settlement, which was at present isolated from the rest of the world. The traders at Red River Settlement were obliged to go to St. Paul for all the goods they required, a distance of 580 miles, at a charge of 120 dollars per ton. Moreover, American squatters were pushing their way into Red River Settlement with the view to divide British Columbia from Canada. Mr. Waddington finally called attention to the rapid progress being made by the Americans with their Central Pacific railroad connecting New York with San Francisco, which would be finished in 1870, and strongly urged that this country ought not to allow itself to be outstripped in the race.

The PRESIDENT remarked that the portion of the paper which more particularly concerned them as geographers, was that which described the previously unexplored districts of British Columbia. Mr. Waddington had shown that the Yellow Head Pass—the pass which Lord Milton and Dr. Cheadle had chosen —was the very best pass for transit between the east and west. But instead of passing down to the mouth of the Fraser River, as Lord Milton and Dr. Cheadle proposed, he had pointed out an entirely new route by the head of Bute Inlet, which conducted into a level country which was easily traversible by railroad. His description of the Bute Inlet road and the Rocky Mountains was entitled to the highest commendation as an important addition to our geographical knowledge.

Captain G. H. RICHARDS said he had spent nearly seven years surveying the sea-coasts of British Columbia and Vancouver Island, and he could conscientiously support the views of Mr. Waddington. The question of a route connecting Canada with the colonies on the Pacific coast was of vital importance no less to this country than the colonies. So soon as that route is accomplished, federation between Canada and British Columbia would be effected, and the retention of British Columbia would be secured. At present British Columbia and Vancouver Island were cut off from this country by 16,000 miles of sea, and were entirely dependent on the British Navy for their protection. So soon as there was a route opened throughout our own territory, all this would be changed. Of the three routes which had been alluded to, the North Bentinck Arm route was too far north; and the Fraser River, though it had many advantages which Mr. Waddington had in his opinion under-estimated, being more available for navigation than he allowed, would not, however, become the western terminus of the route, owing to the obstacles intervening between its lower course and the head of the navigation. The Fraser River was a magnificent stream in its lower part, and it was available for navigation and commerce in suitable vessels; but in the upper waters existed the rapids and mountain ranges which Mr. Waddington had spoken of. If there were not these difficulties he should be in favour of the Fraser River, simply because it was further south, consequently in a less rigorous climate, and it was also the natural opening into the country. Bute Inlet was more likely to be the western terminus of an overland route than any other on the coast. He congratulated Mr. Waddington on his able paper, and on the great perseverance, energy, and industry which he had shown in the exploration of this route; and he hoped he would be rewarded by seeing his schemes carried out.

Dr. RAE said he found the latitudes and altitudes given by Mr. Waddington agreed almost exactly with his own. He had been down the bend of the Fraser River in small canoes with the view of examining telegraph-routes. He saw several places that could not be made navigable for steamers; and there was one rapid that ran at the rate of about 15 miles an hour, full of rocks and stones, five miles long, above Fort George. Some of the ablest men from the Red River were in his party, and they said they never passed worse rapids in their lives. Above the Quesnelle the rapids were so bad that nearly every year men were lost in them, and it was only the expertness of his own men that saved his party from being lost once or twice. In another part of his route, he might add, that two years ago a gentleman was sent to examine the Saskatchewan for the purpose of ascertaining whether it was practicable for steam-navigation, and his report was unfavourable. It is true the year he was there might have been an exceptional one. He believed these rivers, though probably practicable at one time for steam-navigation, had become, from the wearing away of the banks and the widening of the stream, much shallower, and consequently less available for steamers. The late Governor of the Hudson's Bay territory, Mr. Dallas, was the first to point this out to him with regard to the Red River, on which a steamer was placed some years ago, but it had scarcely ever made more than one trip every season since, in consequence of the shallowness of water. At Fort Garry, within the memory of man, the river was so narrow that a person could throw a stone across; it was now several hundred yards wide, and the depth of water was thereby diminished.

Mr. DALLAS, late Governor of Prince Rupert's Land, had great pleasure in bearing testimony not only to the accuracy of Mr. Waddington's description, but to the time, labour, and money he had bestowed upon these explorations. He was entitled to the merit of being the first to explore the territory from the head of Ponte Inlet, through which he had drawn his proposed railway. With regard to the navigation of the Saskatchewan, he could confirm what had been said by Dr. Rae. All these rivers were gradually getting wider, their beds were rising, and, in consequence, their waters were every year assuming different channels. The Saskatchewan partook of the character of a mountain stream; during one portion of the year there was a very large body of water, at another portion it was very shallow, and much obstructed by sand-bars. Therefore, they must not rely too much upon water-communication as a through-line of route across the continent. To compete with the Americans we shall have to depend upon a railway. He had gone over the whole line of the Saskatchewan, both by land and water, and he thought a railroad could be made with the greatest facility, including that part of the region where water-communication could no longer be relied upon.

Dr. CHEADLE, the companion of Lord Milton in an exploration across the Rocky Mountains, said he agreed generally with Mr. Waddington's views. There were one or two points, however, in which he differed from him. One was as to the navigability of the Upper Fraser, in which, as Dr. Rae stated, there were so many rapids that it would hardly be available for steamers. The country from the Red River Settlement to within 200 miles of the Rocky Mountains was so level that a railroad could be made without any difficulty. The only question was, having crossed the Rocky Mountains by the Yellow Head Pass, how were we to get from that point to the level plain on the west? Supposing it were impossible to take a steamer along the Fraser from the western extremity of the Yellow Head Pass to the mouth of the Quesnelle River, he apprehended it was quite practicable to follow the route taken by Lord Milton and himself, down the north branch of the Thompson River, and so descend upon the southernmost portion of this great central plain. It was of very great importance that this route should be opened as soon as possible, in order to connect British Columbia with Canada. A Commissioner sent by the State of Minnesota to examine the land in the region of the Saskatchewan, reported that it was of the highest value—"a country worth fighting for." Already American squatters were flocking into the territory, and were telling us that "the boundary line was 50 miles too far to the south."

Mr. FREDERICK WHYMPER said he had been over a large portion of Mr. Waddington's route, and he must pay a compliment to his engineering skill. He had scarcely, however, mentioned the magnificent glaciers which were so grand a feature in the country, particularly those at the head of Bute Inlet. The largest glacier was ten miles long and three-quarters of a mile across. The terminal *moraines* were very strongly marked. He (Mr. Whymper) had a very vivid recollection of that visit, having narrowly escaped the fate that befel the larger part of the road party, who were murdered by the Indians but two days after he had left them. His guide, an old Chilicoten chief, was subsequently hung for his share in that terrible massacre.

Mr. **Waddington**, in reply to the statement of Dr. Rae with regard to the Saskatchewan, said he held in his hand a printed report from Mr. Alfred Perry, a well-known and reliable traveller. It was dated June 6th, 1861, and was to the effect that the Saskatchewan was available for steam-navigation. It stated, moreover, that from the "Rapide des Fourneaux," eight miles below the Yellow Head Câche down to the mouth of the Quesnelle, the Upper Fraser was navigable for steamboats; that the river was not less than six feet deep in the shallowest parts, and the current slow, more like a lake than a river. He had also the opinion of Sir James Douglas with regard to the Upper Fraser. There were four rapids. The worst was the *Grande Rqpide*, above the mouth of the Quesnelle; and Sir James Douglas said he was convinced it was not so bad a rapid as the Emory Rapid below Fort Yale, which had been considered impracticable for several years, but was now steamed over daily. If necessary, he could take his railroad 19 miles higher up the plain, and thus avoid this rapid.

Dr. **Rae** said that, at the time of year he was there, the water in the river was so low that no steamer could navigate it.

Mr. **Waddington** added, he had talked the matter over more than once with Mr. Brewster, his deceased foreman, who had been over the route, and that gentleman assured him that a steamer could get through at any time.

The **President** wished to make one observation in conclusion, and that was to repeat what he had said at the commencement of the discussion, namely, that the essential part of the paper was the geographical portion, describing the new route Mr. Waddington had explored from the Bute Inlet, with a view to a railroad connection between our colonies on the Pacific and Canada. If that railroad were ever made, to Mr. Waddington would belong the credit of having pointed out the most practicable and easy line for the purpose.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Additional Notes on the Geography of Southern Peru.* By William Bollaert, Esq., F.R.G.S., &c.

In Volume XXI. of the 'Journal of the Royal Geographical Society' will be found my first paper "On Southern Peru, with Survey of the Province of Tarapacá," by my friend Mr. George Smith, F.R.G.S., and myself, in 1827, but brought down to the date of publication, viz., 1851.

Since then, I have again visited Peru, and explored more particularly the southern portion, which has become an interesting commercial locality, in consequence of the working of the vast deposits of nitrate of soda, and the discovery of the valuable borate of soda and lime; and I have brought the additions to the Map of the Province of Tarapacá up to 1866.

The nitrate of soda is a well-known fertiliser, extensively used in the arts, also in the manufacture of gunpowder. In 1820 samples of refined nitrate were sent to Europe; in 1830 a few tons. Its export then went on increasing, when last year it amounted to 125,000 tons. The nitrate contains a large quantity of iodine, and experiments are in progress for economically separating this valuable substance. Bromine also exists in the nitrate.

The Peruvian province of Tarapacá, in the department of Moquegüa, is bounded on the north by that of Arica, on the east and south by the Republic of Bolivia, and on the west by the Pacific Ocean; a rainless desert region.

The Quebrada, or ravine of Camarones, in the north, in 19° 12′ 30″ s., is generally considered the boundary with Arica; but the people of Tarapacá say their boundary is a few miles further north. In the south the River Loa, in 21° 28′ s., is the boundary with Bolivia; and in a MS. Report,* in my possession, of 1628, the first boundary pile of stones is placed at the mouth of the River Loa.† When on the survey of the province in 1827, our guides told us that the mountain of Cancoso, about 68° 15′ w., was on the eastern boundary.

The population of the province is from 19,000 to 20,000, composed of Peruvians, some Chilenos, foreigners, and Indians of the Aymará family, the latter wholly employed in taking provisions on mules and asses from the interior to the Oficinas or Nitrate Works, then conveying the refined nitrate to the coast for shipment, returning with Chile (and even English coal) and provisions to the Nitrate Works, of which there are about 100, giving employment to nearly the whole population.

The principal points of embarkation of the nitrate are Iquique, Mejillones, Pisagua, Junin, Molle, Chucamata, and Patillos. Huano is taken from Huanillos, Pabellon, P. de Lobos, and Puerto Ingles.

There are three ravines that cut through the province from east to west, or from the Cordilleras to the sea, having long desert tracks between them. Are these entirely water-worn ravines, or have they been partially formed by earthquake fissures? In some of these, particularly in that of Pisagua, there are very deep, narrow, and perpendicular clefts, known as *Mal Pasos*, not to be traversed. That of Camarones in the north, into which run the smaller ones of Chisa and Liga. That of Pisagua, with brackish water, I have traced up to the dividing ridge or pass of Pichuta, 14,300 feet above sea-level; the generally dry ravine of Tiliviche enters that of Pisagua at the western edge of the extensive table-land or Pampa de Tamarugal. That of the Loa has a saline river.

There is a second set of ravines also rising in the Cordilleras, their waters generally saline, which flow into the Pampa of Tamarugal.

Also a third, including numberless dry ravines; however, when heavy rains occur in the Cordilleras, a small portion of water would be conducted by these into the Pampa.

The region in which these ravines rise is composed of huge mountain-chains, sometimes called the Cordillera of the Coast, some of the peaks over 22,000 feet, and one—the Lirima—is probably over 23,000 feet above sea-level; with apachetas—piles of stone in passes—abras, or passes, from 13,000 to over 15,000 feet; one, that of Pusupucâne near the Lirima Peak, I am informed by Mr. Williamson, is 16,146 feet.

Within the Cordilleras are hollows and plains, at 12,000 to 14,000 feet, their central parts being either marshes or lakes, some of the latter containing three or four sorts of small fish. These lakes do not appear to have outlets, their waters being kept on a level by percolation and evaporation,

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* Contained in 'Memoria de la S. Iglesia de Arequipa par El Arcediano F. J. de Acheveria,' 1810.

† In Ondarza's Map of Bolivia the boundary comes down to Chuicchuic on the Loa; I only take it up to Quilliagua.

Having surmounted these passes, say in the north, the descent is to the great Andean table-land, and about east from the volcano of Isluga is the south end of the great Lake Aullagas.* To the south and east of the copper-mines of Yabricoya,† and having surmounted the passes in the Cordilleras of Sillilica, and as high as 15,422 feet, there are salt plains and salt lakes, one 60 miles across, to the east of which are other great mountain-chains, sometimes called the Andes, with the Illimani 24,155 feet, and the Illampu 24,812 feet. Above Huatacondo, in the province of Tarapaca, are many high passes, that of Remedios 14,450 feet.

The city of Iquique was declared to be the capital of the province in 1866. Fitzroy in 1835 gave for the latitude 20° 12' 30" S., 70° 13' 30" W. (the old church). Gillis and Moesta's more recent observations for the longitude of Valparaiso would go to show that the whole coast of the Pacific is about 4' too far to the west, as placed on Fitzroy's admirable chart. Now if 4' be subtracted from Fitzroy's longitude of Iquique, we shall have the corrected longitude of 70° 9' 30".‡

Iquique with this new branch of industry, the nitrate of soda trade, from the smallest of fishing-villages, has now a resident population of over 5000. The streets are lined with well-built houses; there are several moles, a lighthouse, two churches, hospital, theatre, club, newspaper, and the place is lit with gas; indeed, all the comforts of life are had at this barren spot where there is neither vegetation nor water; the last most necessary article is distilled from that of the ocean. Some of the silver ores of Huantajaya are amalgamated here with sea-water.

Another great sign of progress is the construction of a railway from Iquique to La Noria, 38 miles in length, a great centre of the nitrate refiners, which, when finished, will diminish the wear and tear of 15,000 horses, mules, and asses, employed in taking fuel, provisions, &c., to the interior, and bringing down refined nitrate.

Some observations on this line surveyed by Mr. Pickering, as well as another projected across the Cordillera into Bolivia, by Herr Reck, will give an idea of the great elevation of the country above the level of the sea.

The Iquique and Noria line commences at the former place to the base of the coast-range, then by a long and sandy ascent of 10 miles, near to the upper part of Molle, 1761 feet. The line then curves round the mountain of Santa Rosa to the Noria, 3277 feet. Now begins the line into Bolivia by the town of Tirana, in the Pampa of Tamarugal, 3302 feet; Pica, at the base of the Cordillera, 4488 feet; then over the north end of the Serrania of Huatacondo, by a pass 12,942 feet; along the Pampa of Chacarilla, 12,660 feet, by the north end of the Cordillera of Sillilica, thence to Garita, 12,296 feet. There are peaks 5000 feet above the more elevated passes; one of the latter in this direction, east of the Pampa of Huasco, is 15,422 feet. The descent is now to the great table-land, where in the east and north-east is the Cordillera Real, containing, among other giants of the Andes, Illimani and Illampu. Skirting the north side of the Pampa of Inpejsa to Siesigua, 12,431, to Canquella, 12,155,

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[*] Dalence, 'Geografia de Bolivia,' p. 36, calls this the mysterious Lake of Pampa Aullagas (or Poopo-Choro), with many inlets, but no outlets, and always at same level. It is thought there is an underground communication on the coast of Tarapaca, and it was reported at the commencement of the last century that fragments of floats of rushes as used on the lake were found on the coast near Iquique. I may observe that, considering the great elevation of the lake, 12,136 feet, with the powerful evaporation that takes place, caused by the rarefied state of the atmosphere, and percolation, is sufficient to keep the lake on a general level.

[†] See 'Mapa de Bolivia 1864, proyecto del Ferro-carril á la Costa por Hugo Reck.' Wyld, London. Private distribution, with a pamphlet.

[‡] 'Geogr. Soc. Journal,' 1858; 'S. American Pilot,' King and [illegible] Part II. p. 437.

Isuaya, 12,165, through the salt lake and marsh of Coipasa, 12,136, to the River Laga-ahuira, through the Lake of Pampa Aullagas, 12,136, the River Desaguadero to Lake Titicaca, 12,601, whence the Peruvian frontier city of Puno, 12,630, and La Paz, the capital of Bolivia, 12,226 feet above sea-level, are easily reached.

We will now return to the coast. The mean summer heat, in the shade, at Iquique:—8 A.M., 72°; noon, 78°; 8 P.M., 84°. Mean winter heat:—8 A.M., 63°; noon, 67°; 8 P.M., 62°. These low temperatures in 20° S. lat. are owing to the following causes:—

1st. The continuous south cold current (Humboldt's) running along the coast of the Pacific, of from 12 to 18 miles in the 24 hours.

2nd. The winds are mostly from the cool south.

3rd. At night, during the greater portion of the year, the terral, or land breeze from the Andes, is always cool.

4th. There is cloudy weather in the winter months, with north and north-west winds and thick mists, and rarely a slight drizzle or *garua*. The barometer is very steady in this portion of the Pacific.

When I first knew Iquique in 1826, there was seldom more than a hundred people there, and it was very healthy; but at Pica and Tarapacá, in the interior, at over 4000 feet above sea-level, and where there is water and vegetation, malaria was generated, giving rise to terciana or ague; at 6000 feet fever disappeared.

For some years past, about the month of June, this spot is visited by *peste*, of a bad bilious and yellow fever character, thought by some to be brought by the steamers from Panamá; however, others believe this *peste* is engendered on the spot. There is now a considerable population, the soil is sandy, and there is no drainage, to which must be added the ordure of thousands of animals that bring the nitrate from the refineries; then a hot sun on the soil-impregnated ground are sufficient causes for this, at times, fatal visitation of *peste*. Some idea of the great number of horses, mules, and asses that die at Iquique may be formed from the heaps of skeletons seen.

During the winter the gigantic cactus, 30 to 40 feet in height, and 10 to 15 feet at the base, thrives on the Lomas or summits of the mountains of the coast. I found the following live Bulimi on these plants: *B. virgulatus*, *B. erosus* and *Succinea broderipii*; and at the roots of the plant heaps of their dead shells.

A few bulbous and other plants appear at this season—the *Tiempo de Flores*—for the inhabitants of these dreary desert shores, who ascend to the *Lomas* to pic-nic and gather flowers, especially of blue and white lilies, and an oxalis of which a salad is made. When the drizzles have been plentiful, a very little pasture makes its appearance; then the Indian donkey-drivers take their animals up to the Lomas to nibble at fresh fodder.

Occasionally a stray huanaco and a fox may be met with; the mighty condor is seen hovering about, and the little slate-coloured bird the *Come sebo*, or Tallow-eater.

The following are the names of some of the plants I collected on my last visit,* kindly examined and named by Mr. Miers:—Cleome chilensis var. pubescens, Talinum, Bryonia convolvifolia, Argylia feullei, Gilia (?), convolvulus, verbena, Lycium fragosum, Nolana atriplicifolia, Dolia vermiculata, Tetersena amæna, Sisyrinchium (?), Leucocoryne ixiodes, Notholœna remota, Usnea, Oxalis, Peperomia, Chenopodiacea.

A severe earthquake shock is expected about every six or seven years, and
over the province. In 1795 as many as forty shocks were felt in one
18 a series were felt for fifteen days. The terrible terremotos of

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of my first to the late Mr. Lambert, which are now in the

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The city of Iquique was declared to be the capital of the province in 1866. Fitzroy in 1833 gave for the latitude 20° 12′ 30″ s., 70° 13′ 30″ w. (the old church). Gillis and Möesta's more recent observations for the longitude of Valparaiso would go to show that the whole coast of the Pacific is about 4′ too far to the west, as placed on Fitzroy's admirable chart. Now if 4′ be subtracted from Fitzroy's longitude of Iquique, we shall have the corrected longitude of 70° 9′ 30″.‡

Iquique with this new branch of industry, the nitrate of soda trade, from the smallest of fishing-villages, has now a resident population of over 5000. The streets are lined with well-built houses; there are several moles, a lighthouse, two churches, hospital, theatre, club, newspaper, and the place is lit with gas; indeed, all the comforts of life are had at this barren spot where there is neither vegetation nor water; the last most necessary article is distilled from that of the ocean. Some of the silver ores of Huantajaya are amalgamated here with sea-water.

Another great sign of progress is the construction of a railway from Iquique to La Noria, 33 miles in length, a great centre of the nitrate refiners, which, when finished, will diminish the wear and tear of 15,000 horses, mules, and asses, employed in taking fuel, provisions, &c., to the interior, and bringing down refined nitrate.

Some observations on this line surveyed by Mr. Pickering, as well as another projected across the Cordillera into Bolivia, by Herr Reck, will give an idea of the great elevation of the country above the level of the sea.

The Iquique and Noria line commences at the former place to the base of the coast-range, then by a long and sandy ascent of 10 miles, near to the upper part of Molle, 1761 feet. The line then curves round the mountain of Santa Rosa to the Noria, 3277 feet. Now begins the line into Bolivia by the town of Tirana, in the Pampa of Tamarugal, 3332 feet; Pica, at the base of the Cordillera, 4483 feet; then over the north end of the Serrania of Huatacondo, by a pass 12,942 feet; along the Pampa of Chacarilla, 12,660 feet, by the north end of the Cordillera of Silillica, thence to Garita, 12,296 feet. There are peaks 5000 feet above the more elevated passes; one of the latter in this direction, east of the Pampa of Huasco, is 15,422 feet. The descent is now to the great table-land, where in the east and north-east is the Cordillera Real, containing, among other giants of the Andes, Illimani and Illampu. Skirting the north side of the Pampa of Impejsa to Sicsigua, 12,431, to Canquella, 12,155,

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* Dalence, 'Geografia de Bolivia,' p. 30, calls this the mysterious Lake of Pampa Aullagas (or Poopo-Choro), with many inlets, but no outlets, and always at same level. It is thought there is an underground communication on the coast of Tarapacá, and it was reported at the commencement of the last century that fragments of floats of rushes as used on the lake were found on the coast near Iquique. I may observe that, considering the great elevation of the lake, 12,136 feet, with the powerful evaporation that takes place, caused by the rarefied state of the atmosphere, and percolation, is sufficient to keep the lake on a general level.

† See 'Mapa de Bolivia 1869, proyecto del Ferro-carril á la Costa par Hugo Reck.' Wyld, London. Private distribution, with a pamphlet.

‡ 'Geogr. Soc. Journal,' 1858; 'S. American Pilot,' King and Fitzroy, 5th edit., Part II. p. 437.

Isuaya, 12,165, through the salt lake and marsh of Coipasa, 12,136, to the River Laga-ahuira, through the Lake of Pampa Aullagas, 12,136, the River Desaguadero to Lake Titicaca, 12,601, whence the Peruvian frontier city of Puno, 12,630, and La Paz, the capital of Bolivia, 12,226 feet above sea-level, are easily reached.

We will now return to the coast. The mean summer heat, in the shade, at Iquique:—8 A.M., 72°; noon, 78°; 8 P.M., 84°. Mean winter heat:—8 A.M., 63°; noon, 67°; 8 P.M., 62°. These low temperatures in 20° S. lat. are owing to the following causes:—

1st. The continuous south cold current (Humboldt's) running along the coast of the Pacific, of from 12 to 18 miles in the 24 hours.

2nd. The winds are mostly from the cool south.

3rd. At night, during the greater portion of the year, the terral, or land breeze from the Andes, is always cool.

4th. There is cloudy weather in the winter months, with north and north-west winds and thick mists, and rarely a slight drizzle or *garua*. The barometer is very steady in this portion of the Pacific.

When I first knew Iquique in 1826, there was seldom more than a hundred people there, and it was very healthy; but at Pica and Tarapacá, in the interior, at over 4000 feet above sea-level, and where there is water and vegetation, malaria was generated, giving rise to terciana or ague; at 6000 feet fever disappeared.

For some years past, about the month of June, this spot is visited by *peste*, of a bad bilious and yellow fever character, thought by some to be brought by the steamers from Panamá; however, others believe this *peste* is engendered on the spot. There is now a considerable population, the soil is sandy, and there is no drainage, to which must be added the ordure of thousands of animals that bring the nitrate from the refineries; then a hot sun on the soil-impregnated ground are sufficient causes for this, at times, fatal visitation of *peste*. Some idea of the great number of horses, mules, and asses that die at Iquique may be formed from the heaps of skeletons seen.

During the winter the gigantic cactus, 30 to 40 feet in height, and 10 to 15 feet at the base, thrives on the Lomas or summits of the mountains of the coast. I found the following live Bulimi on these plants: *B. virgulatus*, *B. erosus* and *Succinea broderipii;* and at the roots of the plant heaps of their dead shells.

A few bulbous and other plants appear at this season—the *Tiempo de Flores*—for the inhabitants of these dreary desert shores, who ascend to the *Lomas* to pic-nic and gather flowers, especially of blue and white lilies, and an oxalis of which a salad is made. When the drizzles have been plentiful, a very little pasture makes its appearance; then the Indian donkey-drivers take their animals up to the Lomas to nibble at fresh fodder.

Occasionally a stray huanaco and a fox may be met with; the mighty condor is seen hovering about, and the little slate-coloured bird the *Come sebo*, or Tallow-eater.

The following are the names of some of the plants I collected on my last visit,* kindly examined and named by Mr. Miers:—Cleome chilensis var. pubescens, Talinum, Bryonia convolvifolia, Argylia feullei, Gilia (?), convolvulus, verbena, Lycium fragosum, Nolana atriplicifolia, Dolia vermiculata, Tetersena amæna, Sisyrinchium (?), Leucocoryne ixiodes, Notholœna remota, Usnea, Oxalis, Peperomia, Chenopodiacea.

A severe earthquake shock is expected about every six or seven years, and felt all over the province. In 1795 as many as forty shocks were felt in one day. In 1818 a series were felt for fifteen days. The terrible terremotos of

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* **I presented those of my first to the late Mr. Lambert, which are now in the British Museum.**

18th September, 1833, already alluded to, which destroyed Taena, had here the effect of calming the sea and dispersing the clouds.

I was at Macaya at 6270 feet, 2nd Feb., 1854. At 9 A.M., a rumbling noise was heard as if from the depths of the Andes, and then the shock of ten seconds; this was felt at Tirana in the Pampa of Tamarugal.

March 10th, 1854.—Being in the town of Tarapaca, 4210 feet, at the base of the Andes, I experienced a series of heavy shocks, commencing at 5.27 P.M., continuing at intervals for seven minutes. A revolution had broken out, volleys of musketry firing, people being killed and wounded whilst the shocks were going on. I sought shelter in the house of a friend; candles were burning before a crucifix, my friend's sister was kneeling and prayed before it, "O Lord God the Saviour! See, see Christ is angry at what is going on! Save us, Lord, save us!" This is known as the *Batalla del Temblor*. On the 4th April following I was at Iquique, when there was another fatal political fight, headed by one named Legay, this is called the *Batalla de los Assessinos*.

From my note-book, 1854:—

August 25th, 6 A.M., at Iquique.—Slight noise, a push, then a smart shock. 26th, 2.30 A.M.—Shock with pushing motion, which awoke me. Had there been another moment, I should have jumped up and made for the open pampa. 30th, 12.15 P.M.—Sharp shock. *September* 27th, at La Noriá, 4.30 P.M.—Sharp shock was felt at La Tirana same time. 28th, at La Tirana. —Sharp shock 9 P.M. *October* 9th.—At Iquique, 8.30 P.M.—Smart little earthquake from the land side. 19th, noon.—Sharp shock (felt same time at La Tirana); people flew out of their houses to the open ground, screaming "Miserecordia!" (About this period a volcano had burst out north of Copiapo, and the smoke of it seen from the port of Caldera). 23rd, noon.—Slight shock. 29th, 6 A.M.—Long and heavy shock; the rush of a long wave on the shore was heard, which was attributed to it.

Leaving the porphyritic rocks north of the town of Iquique, the shore of the Ansuelo pampa is reached, where there is a slightly elevated sandy ridge. Behind is a depression into which sea-water filters; this, mixing with dead shells there, of Concholepas, Trochus, Mytilus, Venus, Mesodesma, Chitons, Balanas, &c., decomposition of sea-water and shells takes place, when one of the products is a large quantity of a well-crystallised salt, principally a sulphate of lime. This spot is the narrow edge of an extensive shelly plain of elevation (not being uncommon on these coasts), which sweeps round Iquique going some distance inland. This great deposit of dead shells is called *Conchuelo*, and near the sea the shells are pretty perfect, but inland broken and in powder. In places they are 10 feet thick, and are burnt into lime for building purposes. It may be observed that very few shells are thrown up on this part of the coast at the present time.

From the Ansuelo rocks round to P. Piedra the whole distance is high, rocky, and escarped, in places over 2000 feet above the sea-level. Mr. David Forbes, F.R.S., tells me that what I have called granite here is diorite. There is a break in the Mountains of Guantaca, and here the diorite is seen in conjunction with the porphyry; the Cacti only grow on the crumbling diorite, and not on the hard porphyry.

The Island of Iquique, formerly thickly covered with Huano, is of porphyry, and appears to have been at one time a collection of rocks, the channels now filled up with broken shells, and there is a shelly elevation from 20 to 30 feet thick. The island is covered with rounded stones—may this not show that elevation is going on?

Six miles south-east from Iquique is Molle, a shipping-port for nitrate. The route to it is over the shelly plain, through sand-hills, to a more elevated shelly plain, having shelly cliffs at the port of Molle over 50 feet in height. There is no water except that of the sea, yet I observed abundance of flies, mosquitoes, vinchuctas, lizards, rats, mice, scorpions, centipedes, and large fleas. The Sargasso, a gigantic sea-weed, is in great abundance.

The porphyritic coast of Molle is very steep, much of its lower portion deeply covered with disintegrated rock. In August, 1853, half a league from Mejillones (19° 15′ s.), there was a great fall of disintegrated rock from the upper part of the mountain into the sea; this lasted several days, the noise was heard at Mejillones and clouds of dust seen in the air. In this fall of loose rock, bones of whales and other marine animals were found, some as high as 50 feet above sea-level.

Of the several excursions I made up into the mountains of the coast, I will particularize the exploration of the Morro of Tarapacá, its summit at least 6000 feet above sea-level. I was accompanied from Molle by my friend Dr. Bokenham. We journied on horseback to P. Grande early in the morning, ascending along the base of the mountain to a slope progressing zigzag upwards, and a hard pull-up it was, when we came upon an extensive, undulating, broken, sandy desert tract at least 3500 feet, the summit of the Morro being still more than 3 leagues off, which we did not feel inclined to go to, it being long past noon. Whilst resting we had a good look at this most desolate of scenes. Leading our horses we descended diagonally to the left a very steep portion of the Morro in the direction of the upper part of Molle. Scrambling up and down, our progress was often abruptly stopped by approaching the escarped sides of the coast. Bearing now to the right, descending very steep places, our course became unsafe, for, had we slipped, where we should have rolled to it is difficult to say. Here my companion's horse got away, when he followed it. I continued the descent, plunging repeatedly into deep loose stuff, and suffocated with the finer portions. At last I got to the bottom, when I saw my companion, but without his horse. The animal, I learnt, had got on a *Barranca*, or rocky ledge, and was a fixture. The following morning a *Vaqueano*, or good guide, managed to extricate the animal.

This mighty mass of a mountain, the Morro Grande of Tarapacá, appears to be entirely composed of red porphyry—say over 6000 feet thick.

Elevations above the Level of the Sea in the Province of Tarapacá, by Mr. George Smith in 1853, *by Aneroid.*

	Aneroid.	Feet.
Iquique	29·83	
Foot of Cuesta or zigzag		880
Summit of ditto		1,667
Meeting of roads to Molle		2,089
Top of a Cuesta		2,475
Road to Molle		2,385
End of Encañada—Noriá road leading to S. Rosa		3,045
Aguada de la Sal, Piedra Grande		2,830
Pintados, Alto de la Aguada del Sal		3,261
Alto del Meadero		3,303
La Noria, Nitrate Works at the Salar, the latitude of the Maquina 20° 25′ s.		3,277

Section from Pisagua, across the Mountains of the Coasts to the Northern Nitrate Works. By Mr. Cunningham, 1854, *by Aneroid.*

	Feet.
Port of Pisagua. 100 feet above sea-level the Aneroid stood at 29·0023.	
Brow of hill	1,660
First height in road	2,651
Hollow in road	2,372
Second height	2,997

Section from Pisagua—continued.

	Feet.
Second hollow	2,966
Third height	3,824
Third height, furthest point	4,984
Oficina Martinez (Sal de Obispo)	3,603
Oficina Tres Clavos	3,505
Sal de Obispo	3,505
Oficina Sal de Obispo	3,568
Oficinas of Rosario	3,784
Zapiga	3,721
Tiliviche stream	3,392
Top of ravine	3,656
Tana stream	3,132
Tana, N. bank	3,618
Pozo de los Salitres	3,500
Pozo de los Caliches	3,600
Brow of bank below Tana	3,556
Tana, lower down ravine	3,132
House at Tana	2,900
Point in plain of Zapiga	3,423
Stream at Quifina	3,527
Junction of Tana and Tilivicke streams	1,995
Junction of Pisagua and Zapiga ravine	1,042
Chacra of Saya, two leagues from Pisagua	726

Elevations from Mr. Smith's Survey of the Nitrate Grounds, 1856, *by Aneroid.*

	Feet.
Ravine of Quifina, near Guacucano Caliches	2,703
Cuesta of Huaina Pisagua	1,175
Cuesta on road	2,560
Ditto	2,877
Ditto	3,545
Junction of two roads	3,971
Burro Muerto, junction of two roads	3,753
Osorio Caliches (Sal de Obispo)	3,566
Zabala, I. M., Caliches	3,649
Tiliviche, Borate	3,273
Junin, heights on the coast	2,079
Cuesta above Conca, on the coast	1,765
Junction of roads	2,754
Heights of Cachasa, on the coast	2,480
Mejillones, on the coast	3,140
Cano y Obiedo, Caliches	3,547
La Carolina, Caliches (Sal de Obispo)	3,734
South of Mejillones, on road	635
Ditto Cuesta	2,540
Ditto Ditto	3,320
Mina, meeting of four roads	3,263
Another meeting of roads	3,613
Pampa de Orcoma	3,863
Ditto	3,340
Oyada, Caliches	3,566
Agua Santa, Oficina	3,502
Vernal, J., Ditto	3,566
Negreros, Ditto	3,612
Cuesta above P. Colorada	1,598
Pozo de Guara, Borate	3,517
Ramirez, Caliches	3,536
Yluga, entrance to Valley of Tarapacá	3,640
Town of Tarapacá	4,210

Elevations from Mr. Smith's Survey of the Nitrate Grounds, 1856—continued.

	Feet.
Iquique, top of Cuesta	1,667
Huantajaya Silver-mines, Town	2,877
Peña Abajo, W. side of P. Tamarugal	3,442
Molle, heights of	1,761
La Cruz, a cross on the road	2,368
Encañada, a ravine	3,045
Sebastopol, Oficina	3,291
La Noriá and Salar, Oficinas	3,277
Concepcion, S.E. of Noriá	3,673
La Calera, E. of Pampa	4,505
Matilla, town of, E. of Pampa	3,913
Salar Soronal, Caliches	2,593
Pan de Azucar, Caliches	3,223
Bella Vista, Caliches	3,280

Elevations taken by Mr. Williamson in 1859.

		Feet.
Town of Tarapacá		4,796
Pica		4,290
Mamiña		5,980
Macaya		6,270
Zipisa		10,250
Sotoca		10,351
Coscaya		9,075
Chiapa		10,542
Parina-cocha, Lake		13,576
Mauque		14,342
Turima		14,178
Apacheta de Huascan (pile of stones)		14,430
Springs of Rio Pasirugo		14,079
Apacheta of Pusupucane or Chuncura		14,146
Lakes of Chuncura		15,448
Estancia of Colchani		13,956
La Rinconada		13,685
Estancia of Piga		13,784
Yabricoya, Mt.	W. B.	18,000
Ditto the Ingenio		10,423
Mt. of Cuyacagua		14,364
Mt. of Lagunilla		14,470
Lakes of Huasco		12,350

Elevations by Boiling-point of Water, taken in 1863 *by David Forbes, F.R.S.*

	Feet.
Hospicio de Colon, top of Cuesta of Iquique	1,284
Huantajaya Mines, La Fuente's House	2,726
La Noriá Works	3,052
Quebrada de Pasos	3,146
La Tirana	3,332
Cancha de Montel (Chacra sin Riego)	3,209
Peña abajo	3,679
Ramirez, highest Oficina	4,205
Osorio Oficina	3,814
La Carolina Oficina	3,734
Highest point on road to Pisagua, beyond Burro Muerto	3,971

Latitudes and Longitudes observed by Mr. George Smith in 1826–7.

	°	′	″	°	′	″
Port of Iquique, centre of island	20	12	30 S.	70	14	30 W.
Huantajaya	20	14	0	70	7	0
Matilla	20	31	22			
Pica, church	20	30	8	69	24	0
Huatacondo	20	57	51	69	0	3
Mamiña	20	4	48	69	13	0
Tarapacá, Town	19	56	0	69	35	0
Zipisa	19	36	6	69	16	30
Sotoca	19	36	18	69	15	30
Chiapa	19	32	19	69	13	0
Sibaya	19	47	33	69	9	0
Pisagua, Pichalo Pt.	19	36	30	70	9	0
Camiña	19	17	9	69	18	0
Loa	21	28	0	70	6	15
Maní	21	10	0	69	14	0
Tirana	20	21	27	69	43	30
La Noriá, the Maquina, 1854	20	22	0	69	54	30

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2. *Remarks of* M. LUCIEN DE PUYDT *on the Discussion at the Evening Meeting of* 13*th January, in a Letter to the President.*

To SIR R. MURCHISON, Bart., *President of the Royal Geographical Society, London.*

SIR, 41, Rue de Douai, Paris, 21st February, 1868.

I received a few days ago the "Slip of Meeting" of the Royal Geographical Society for the 13th January, 1868, and I cannot thank you enough for the interest you have shown in my labours in the Isthmus of Darien.

But there is a point of the highest importance to which I must call your attention and that of the Society, as it seriously affects the possibility of cutting a ship-canal across the Isthmus of Darien. This is an erroneous statement, though evidently loyal and sincere, made by Captain Bedford Pim, against which it is my duty to protest.

I read in the slip:—

"Captain BEDFORD PIM. . . . . . It was not his intention to enter into any criticism upon the exploration, because there was a practical difficulty in carrying out the canal scheme across that part of the Isthmus of Darien, which he thought was insurmountable. By the Panama Railway Concession, which has just been passed, dated the 16th of August, 1867, reforming the Contract of April 15th, 1850, the Government of New Granada had bound itself not to construct, or to concede to any person or company the right to construct, a railway or an oceanic canal in the territory to the westward of a line drawn from Point Escoces on the Atlantic to Point Garachine on the Pacific, *which would include the Pacific terminus of M. de Puydt. So that, without the permission of the Panama Railway Company, it was impossible for any one to make a canal, even supposing,*" &c., &c.

In all this there is a profound mistake, not in the fact itself, but in the inferences drawn from it.

The following is an extract from the text of the Contract passed the 16th August, 1867, as printed in the 'Diario Oficial' of Bogotà:—

"El Gobierno no podrà comprender por si, ni permitir que persona alguna comprenda sin acuerdo i consentimiento de dicha Compañia (Panama Railway

Company) la apertura o esplotacion de nigun canal maritimo que comunique los dos Oceanos al travis del espresado Istmo de Panama, al Oeste de la linea del Cubo Tiburon en el Atlántico i Punta Garachine en el Pacifico. Pero quedo estipulado que el derecho que se concede a la Compañia para su consentimiento, no se estiende a que pueda oponerse a la construccion de un canal al travis de l'Istmo de Panama (escepto en la ruta del Ferro-Carril), sino solamente, que pueda exigir un precio equitativo por tal privilegio, i como indemnizacion por los daños que pudiera sufrir la Compañia del Ferro-Carril por la concurrencia i la competencia del canal."

The position of the matter, according to this contract, is as follows:—

1st. It is prohibited to construct a canal on the line of the Railway of Panama, or within the lands conceded to the Company near the railway.

2nd. But the Government retains the right, and can concede the same to companies or an individual, to construct a ship-canal to the westward of the line drawn from Cape Tiburon to Point Garachine (except on the line of the railway) but with obligation to pay an equitable indemnity in favour of the Panama Railway Company.

3rd. It has an absolute right, and without exception, to construct a ship-canal to the eastward of the line aforesaid, without obligation to pay any indemnity to the Panama Company, but with this precise condition,—that the two termini, or any part of the canal, shall not pass to the westward of the line from Cape Tiburon to Point Garachine.

Now, the line of canal which I have proposed as a consequence of the exploration narrated in my paper, has its eastern terminus at Port Escondido, or at the mouth of Tanela River (Atlantic side), and the western one in the channel itself of the River Tuyra, near the mouth of Chucunaque River; this is about 20 miles distant to the eastward of the line of delimitation, where ceases the right of the Panama Railway Company.

It is, then, between those two extreme points that has been settled the delineation of the Columbian Canal. From the western terminus the navigation and "transit" are free, without any exception, and cannot be the subject of any privilege or restriction. The waters of rivers, lakes, &c., and their use, are the property of the Republic, and never could be alienated in favour of any person or company.

The "transit" by the channel of the Tuyra River is entirely free to every one, from the western terminus of the canal to the Pacific Ocean, crossing the Gulf of San Miguel.

The Panama Railway Company has, besides, offered conclusive proof of the existence of entire liberty to navigate the waters. The railway crosses through the two valleys of the *Chagres River* and *Rio Grande*, cuts many times and goes over these two rivers on various points: notwithstanding, the Company has no right, and does not exercise the right, to prevent the transport of men or wares by means of canoes, *pirogues*, rafts, &c. This daily transport has no great importance, it is true, but it is the sanction, upon a privileged territory, of the right of free navigation according to the laws of the Republic.

With regard to the heights, &c., given in my memoir, I stated that they were only approximate, and explained why I could do no more. I know perfectly well that a new survey by engineers and practical men would be necessary to determine in a definitive manner the height of the depression of the summit-level; but I confidently believe the altitudes I have given to be near the truth.

I would desire to state to the Royal Geographical Society, over which you preside, that if a new scientific expedition should be resolved upon in these rich countries of the Isthmus, I would volunteer for the honour of being the guide to the new explorers through these forests, which I know well, having long lived in their midst.

I am, Sir, your most obedient Servant,

LUCIEN DE PUYDT.

3. *Progress of the French Survey Party in exploring the Sources of the Cambodia River.* Extracts from Reports by Colonel ALBERT FYTCHE, Chief Commissioner of British Burmah, to the Secretary to the Government of India.

Rangoon, 9th August, 1867.

I HAVE the honour to report, for the information of his Excellency the Viceroy and Governor-General of India in Council, that I have learnt that the French survey party, which left Saigon four or five months ago to explore the course of the Cambodia River, have reached the Shan States tributary to Yunan to the eastward of Bamo. They wrote from Mainglon or Maingla, to the Court of Ava, requesting permission to visit Mandalay, and a favourable reply has been sent, inviting them to visit the Burmese capital. The invitation to the party left Mandalay about the 31st July last.

The course laid down for the survey party was to ascend the Cambodia River, and follow its course along its banks as far as the Chinese frontier, and then to turn to the west, endeavouring to reach Bamo or some other place in the valley of the Irrawaddy. The town named Mainglon, or Maingla, is about north latitude 24° 30′ and east longitude 98° 40′, 98° 15′, 98° 5′, there being three towns named respectively Mainglon, Mainglon,* and Maingla, of the longitudes approximately given above. These towns are all on the main road from Tali, or Talifoo, *viâ* Yunchang to Bamo; the first of the three being on the route from Yunchang, Meinmo, and Bamo, the other two being on the route from Yunchang, Momein, and Sanda, or alternatively Moroun to Bamo. Practically, however, they are all much the same distance from Bamo, about a degree and a quarter to the eastward, and separated from that town only by the Kakhyen Hills. Their route up the Cambodia River must have been a successful one if they succeeded in following its course as high as Yunchang, the point from which they have apparently struck westward to Bamo.

27th January, 1868.

I HAVE to report that nothing has been heard of the party since its arrival at Kyan Hung. When at Mandalay I was informed that a letter had been received from the Tsanbwa of Kyan Hung, reporting the arrival of the mission there, and soliciting instructions whether the mission was to be allowed to pass through his territory, and his Majesty sent orders to the effect that they were to be permitted to proceed in any direction they pleased.

From no information having been received of their whereabouts since, I imagine they must have proceeded as far up the Cambodia River as possible, and then diverged into the track of the caravans, which leave the province of Sz'chuen yearly for the large trading mart of Hankow, situated at the mouth of the Han River, at its juncture with the Yangtse-Kyang.

A caravan has lately arrived at Mandalay, *viâ* Theinwee. They have heard nothing of the French mission; but this is not likely, if they have taken the route I now suppose they have, as the caravan comes from the north-western Yunan, whereas the French party, if it did pass through any part of Yunan, would traverse its south-eastern portion.

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* Two towns of the same name.

4.—*Heights and Positions of the Principal Mountains and Hills of Iceland.*

By R. Brown, Esq., F.R.G.S.

Name of Height.	Height above Sea in Danish Feet.	Latitude North.	Longitude W. of Copenhagen.	Longitude W. of Greenwich.	Remarks.
		° ′ ″	° ′ ″	° ′ ″	
Oræfa Jökull ..	6241	64 00 48	29 20 16	16 45 29	
Eyjafjulla Jökull	5432	63 37 02	32 16 18	19 41 31	
Herdubreid	5290	65 10 39	28 58 55	16 24 08	
Hekla	4961	63 59 02	32 19 02	19 44 15	
Snæfells Jökull ..	4577	64 48 04	36 25 08	23 50 21	
Heljarf Jökull ..	3991	65 48 26	31 31 56	18 56 09	(or) Heljarfjall.
Mælifells Shnúkur	3476	65 23 30	31 59 10	19 24 23	
Gláma	2872	65 49 46	35 40 07	23 05 20	
Dránga Jökull ..	2837	66 10 32	34 55 35	22 20 48	
Lómagnúpur ..	2455	63 58 57	30 09 02	17 34 15	
Príhyrníngur ..	2387	63 47 00	32 36 49	20 02 02	
Reydarfjall	1894	64 55 27	26 21 13	13 46 26	
Ingolfsfjall	1742	63 59 37	33 39 50	21 05 03	
Klofníngur	1598	65 13 04	35 05 34	22 30 47	
Keilir	1239	63 56 21	34 48 32	22 13 45	
Akrafjall	1160	64 19 00	34 36 19	22 01 32	
Heimaklettur ..	916	63 26 53	32 53 49	20 19 02	
Reynisfjall	765	63 24 46	31 39 50	19 05 03	Vestman's Islands.
Hjörleifshöifdi ..	740	63 24 56	31 22 45	18 47 58	
Dyrhólaey	392	63 23 59	31 45 57	18 11 10	
Ingólfshöifdi ..	260	63 48 19	29 16 16	16 41 29	Portland.

Note.—This table is computed for the most part from Professor H. C. F. C. Schjellerup's original observations made for Iön Sigurdssyni's Icelandic Almanac (Almanak umáreptir Kristsfœding 1867 semerhlaupár og annad ár eptir sum—arauka—reiknad eptir afstödu Reykjavikur á Islandi—af H. C. F. C. Schjellerup, Professori en Islenskad og lagad eptir Islenzku timatali af Ioni Sigurdssyni). I have left the heights as they were originally taken, in Danish *Fod*—a measure so nearly equivalent to the English *foot*, that no good purpose in physical geography would be served by reducing it. The longitudes I have given as measured west of Copenhagen, but for the convenience of English geographers I have also reduced them to the meridian of Greenwich, taking the longitude of Copenhagen New Observatory as 12° 34′ 47″·5 E. of Greenwich (lat. 55° 40′ 52″·6 N.*), according to the observation adopted by the Konglige Kart Archiv in Copenhagen. As I can find no similar list in any English work, nor indeed the correct altitude or position of any one point in Iceland *correctly* given, I conceive that in the present form this table may be of some little value to English physical geographers.

Robert Brown.

Copenhagen, Nov. 10th, 1867.

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* The longitude in time of the University Observatory of Copenhagen is, according to the 'Nautical Almanac' ('Ast. Nach.,' vol. xix. 120), 0h. 50m. 19s.·8 E. of Greenwich, and lat. 55° 40′ 53″·0 N. ('Ast. Nach.,' vol. v. 366). In the above table I have omitted the decimals of seconds.

5. *The Auriferous and other Metalliferous Districts of Northern Queensland.* Extracts from a Paper read before the Royal Society of New South Wales, on 3rd September, 1867, by the Rev. W. B. CLARKE, M.A., F.G.S.

(Communicated by Sir GEORGE BOWEN, Governor of Queensland, through the COLONIAL OFFICE.)

A copy of this Paper sent to the Society was accompanied by a Despatch from Sir George Bowen, containing the following observations:—

"Brisbane, Queensland, 16th Sept., 1867.

"In commenting on this Paper, one of the leading journals of New South Wales (the 'Sydney Morning Herald') has observed that, as a perfect acquaintance with the scientific principles of geology enabled Sir Roderick Murchison, more than twenty years ago, to predict the future discovery of gold in Australia, so Mr. Clarke and other eminent geological observers have been able to point with similar certainty to various parts of this continent where a search for gold-fields might be prosecuted with success. By a careful study of the physical conformation of the country, combined with the minute observation and patient comparison of collateral facts, Mr. Clarke has, during a series of years, guided the exploring 'digger,' not only in New South Wales, but also in Victoria and Queensland, to places where gold exists in large natural deposits. These scientific predictions have been verified by the help of Mr. Daintree, formerly employed on the geological survey of Victoria. The observations of this gentleman are embodied in Mr. Clarke's Paper now transmitted. The gold-bearing country indicated appears to be not less than 900 miles in length from south-east to north-west. It is stated that many of the auriferous spots are likely to prove very rich. The 'Cape River Gold Field,' in about latitude 20° 30′ S., and longitude 145° 30′ E., which has recently been proclaimed by my Government under the existing Gold Fields' Act, is about 70 miles long by from 10 to 15 broad. The 'diggings,' already occupied by a considerable number of miners, are situated about 40 miles from the head of the Cape, and about 100 miles from the junction of that river with the Suttar, and about 200 miles inland from the seaport town of Bowen. It will be seen that Mr. Daintree has entered fully into the geology of this district, and has given some interesting information with respect to the Silurian rocks of Northern Queensland. He further observes that, 'although the area of the auriferous rocks is considerable both on the Cape and Clarke Rivers (another of Mr. Clarke's predictions), still it is small when compared with the extent of the old metamorphic gold-bearing slates of the Upper Gilbert,' a river flowing into the Gulf of Carpentaria.

"It will be seen that Mr. Clarke's Paper also treats of the discovery in Northern Queensland of iron and of copper in great purity and abundance. These ores are found in proximity with extensive beds of coal. Mr. Clarke remarks, in conclusion, that in bringing forward so extensive a subject, he had been compelled to be as brief as possible, but that 'enough has been said on this occasion to show that our sister colony of Queensland has every reason to anticipate for her northern districts a future of success in the development of the metalliferous riches with which she has been endowed.'

Such development will, it is hoped, gradually take place through the introduction of English capital as the varied resources of this colony may become better known in the mother country. Meanwhile I venture to suggest that a copy of this despatch and of the enclosed paper should be forwarded to the Royal Geographical Society. The President of that Society, Sir Roderick

Murchison, cannot fail to be gratified by these proofs of the realisation by succeeding geologists of his own scientific predictions of the mineral wealth of Australia.

"I have, &c.,

"G. F. Bowen."

Extracts from the Rev. Mr. Clarke's Paper.

In prefacing what I have to say upon one of the more immediate subjects of the present communication, it may be well to call attention to the striking fact that the great western interior of this continent is bounded to the eastward by a series of generally high insulated ranges, which preserve a nearly meridional direction on either side of the 140th degree of longitude.

Such is the great mass of the South Australian Ranges to the westward of that meridian, and such are the less lofty but rocky fastnesses of the Barrier and Grey ranges of Sturt to the eastward of it; and such also are the ranges at and above the head of the Cloncurry River of Burke and Wills, and that great range to the eastward of the latter, which was discovered by M'Kinlay, and which bears his name. This range is, in all probability, connected with the Barrier and Grey ranges of Sturt, as it is in direct prolongation of their strike.

The whole of these mountain masses are made up of ancient rocks of metalliferous character, and are surrounded by tertiary and post-tertiary deposits, which are partially auriferous, the detritus or drift having received its gold from the disintegration of the quartz veins which intersect certain portions of the older formations.

These ancient masses rise like fragmentary relics of islands (which, undoubtedly, they once were, in tertiary times) out of the present levels of the surrounding deserts, through which the drainages of the still more eastern Cordillera of New South Wales and Queensland diverge to south-west and north-west, transverse to each other in direction, but yet rudely parallel with the respective lines of the eastern and north-eastern coasts, which may be said, for convenience, to meet, as the general trends of the Cordillera do, between the 28th and 29th parallels of latitude. As the western coast of York Peninsula, though extremely low, is nevertheless well defined, and does not very considerably deviate from the general boundary of the South Australian masses along Spencer's and St. Vincent's gulfs—we may consider Eastern Australia to be a distinct and well-defined division of the continent; especially as we now know that the most western waters, which reach Spencer's Gulf to the south-west, and those which pass to the south-eastern corner of the Gulf of Carpentaria rise very near to each other,—countenancing an idea, which is not, however, yet established, that there was once a communication between those localities.

A careful inspection of the chart of Australia—now gradually but nevertheless rapidly being filled in—will show that the coast lines also rudely follow the strike of the main Cordillera and that a series of the lines drawn in their direction will divide the country into mathematical figures of a tolerably regular shape; in fact, no country is in this respect better defined than Australia.

Another feature of the physical conformation of Australia is the persistency with which certain of the older formations follow a geological strike along the meridian or within certain angular deviations from it; so that they recur in the same direction, where the denudation of younger overlying deposits exposes them to an outcrop, and this is most distinctly the case along the extension of the Cordillera to the westward nearly throughout Victoria.

It was this and other collateral facts which very much guided me in pointing out many years ago certain auriferous tracts not only in New South Wales proper, but in Victoria and Queensland, which both at that time belonged to this territory.

It is chiefly of the more westerly portion of these tracts that I have now to speak. In reply to inquiries of various correspondents and applicants in person relating to the Peak Downs district, I long ago advised them to carry their investigations towards the north-west, into and beyond the scrubs of the Suttor River, under the conviction that between that river and the bends of the Lynd there would be found an extension of the auriferous region. And this advice has been found to be in accordance with the results.

It may be proper to give a general geological sketch of the structure of that part of the country which is under discussion.

It will then be seen that in about 18° S., and between 144° and 145° E., the Burdekin and Lynd rivers of Leichhardt head in a gigantic range striking about N.N.E., the latter flowing to north-west, and the former south-easterly. This river flows through a tract of country occupied by granite, pegmatite, gneiss, talc-slate, mica-slate, and limestone, with quartz veins, porphyry, and basalt; being overlain by deposits of conglomerate and sandstone, which are intruded into and broken, contorted and altered by igneous rocks. The basalt, which seems to me, so far as I have examined it, to be as recent as that which forms the upper rock of that name in Victoria, occupies a plateau at the head of the rivers, and as far to the south as the Clarke River, in which it assumes in places the lava-like character which distinguishes much of the country near Melbourne.

Leichhardt and Gregory both describe the occurrence of these formations, and both speak of streams of lava. There can be no doubt then that it is a region of disturbance; the older formations being also highly inclined, and the newer horizontally bedded, these being also occasionally hardened and tilted.

From an examination of collections made by Leichhardt, Gregory, M'Kinlay, and other explorers, I could have no hesitation in believing that gold would exist in that region, otherwise so much in accordance with physical facts elsewhere observed.

Since Gregory's journey, the discoveries of Burke and Wills, and (in search of them) Walker's, M'Kinlay's, and Landsborough's, and still more recently the explorations of Jardine and Daintree have added much to our geological, as well as geographical knowledge of the region between the 141st and 145th meridians. The courses of the new rivers Norman and Einnasleigh which flows to the Staatan of the Dutch have been discovered, and adjustments of the Lynd and Gilbert have taken place somewhat in advance of Leichhardt's arrangement of those waters. We know now also that the waters of the Thomson, to which the Barcoo of Mitchell appears to be a tributary, and the Flinders rise in the same range, not more than from 170 to 200 miles from the Burdekin, and about 200 or 240 from the Cape River which was discovered by Leichhardt as a tributary of the Suttor, and which it enters not many miles from the junction of the latter with the Burdekin.

Within the limits of these boundaries, which by the Suttor is connected with Peak Downs, and then on to Broad Sound, Canoona, Rockhampton, Gladstone, the Don, the Mary, and Brisbane, we have various tracts of greater or less auriferous promise, those tracts cropping out amidst surrounding deposits of middle and upper palæozoic and secondary formations, and overlying areas of tertiary and post pliocene age. The range of country here indicated cannot be less than 900 miles in length from south-east to north-west; and although some of the auriferous spots may not be more rich than the immediate vicinity of Brisbane, yet there are others of a more important character, and even more so than any yet fully developed in Queensland. If, again, we take into account the Fanning River, Keelbottom Creek, Star Creek, and others westward and eastward of the Burdekin, there must undoubtedly be a vast amount of gold yet to be discovered, though, probably, at wide intervals. In this brief summary I do not mention with much expectation the abundant occurrence of such gold as was discovered by me in the quartz pebbles of the secondary fossiliferous rocks of Fitzroy Downs, because that fact may merely testify to the derivation of the quartz from auriferous reefs in secondary times (a very important deduction on another account), and recently an exploration by prospectors of the country 150 miles north-west of Roma, on the Fitzroy Downs, has not resulted in any discovery of alluvial gold, probably because that whole country is of secondary age.

If, however, we include Talgai and other places near the northern boundary of New South Wales, and some mentioned in my own reports, we shall see that Queensland offers ground for great expectation of auriferous wealth. With her coal-fields on the Isaac, the Mackenzie, the Bowen, and at Hervey's Bay, on the Bremer and the Brisbane, the Dawson and the Condamine, she becomes connected with similar coal deposits on the Clarence River, in New South Wales, and by her abundant wealth in copper and iron, bids fair to balance the present superior advantages of our own territory in coal and gold.

The occurrence of copper with gold in some localities in Queensland is also very remarkable. In other places the copper is so rich as to rival the wonderful masses of Lake Superior, the lodes being made up of little else than native copper, without any trace of gold. Whilst in other localities, again, the copper occurs distinct from, but in close proximity to an auriferous area. Such appears to be the case about Mount Wyatt, near the junction of the Burdekin and Suttor, as gold is scattered in the drift all the way to the Belyando.

This leads me back to the Cape River Gold-field.

The Cape River is merely indicated on the chart as entering the Suttor; but it has lately been explored, where practicable, to its head, and stations are occupied between its junction and Hughenden, on the head of Jardine Creek, which is the Macadam River of Walker, and forms one chief head of the Flinders.

From the head of the Flinders, as I learn from another friend, gold may be found in small particles for some distance down the river, though Jurassic and Cretaceous rocks cover the older formations over a large area, as proved by the abundance of fossil shells, &c., and by remains of reptiles, as, for instance, at the base of Bramston Range, at Marathon, on Richmond Downs, on O'Connell Creek, and elsewhere. These rest upon the underlying palæozoic or older deposits which extend to the Burdekin and Suttor.

It is remarkable that Sir Thomas Mitchell should have turned back from the Belyando River, which would have led him to the Suttor, Cape, and Flinders rivers, and have given him his long desired approach to Carpentaria. Mr. Gregory did not see the junction; but he tells us, what is most significant, that he passed over great abundance of drift, and of such a character as seems to be indicative, to a certain degree, of a gold region. Leichhardt also states that the ridges were covered with pebbles. Trap and porphyry occur not far off, and the rocks are often highly inclined.

It has been already stated that gold has been found at the head of the Flinders. Mr. Daintree reports to me that about 40 miles from the head of the Cape, and from 90 to 100 miles (direct, I presume) from the junction with the Suttor, on a tributary called "Betts's Mistake" Creek, the Cape River diggings are situated. He goes on to say:—

"The source of this branch of the Cape is from Mount Three Heads, so called from the fact that a tributary of Fletcher's Creek and Oxley Creek (a tributary of the Flinders) have their sources from the same hill. From Hann and Co.'s cattle-station on Fletcher's Creek, Mount Three Heads is distant 8 miles south, 38 west. Running down Oxley's Creek from its source to its junction with the Flinders, about 15 miles, gneiss, mica, and hornblende slate, with interstratified beds of quartzite, are found to occupy the whole distance.

"On the parallel and more northern tributary of the Flinders, called the

'Walker,' the gold-bearing metamorphic slates pass under the basaltic tablelands, and are hidden from sight. The lower 'Walker' may thus be assumed to be the north-western boundary of the Cape River series of auriferous rocks easily available to the miner.

"Looking from Mount Three Heads, towards the south-east, a broken country of hill and valley presents itself, a line of higher and more abrupt ridges marking the watershed. The creeks and gullies of this range, whether tributaries of the Cape, Flinders, or Betts's Mistake Creek, will, I believe, all be found to be auriferous, and many of them payable. The range itself follows nearly the strike of the metamorphic rocks of which it is composed, and especially at the south-eastern extremity. The dip is south-westerly. Between the upper Cape and Fletcher's Creek the ranges are of syenite. (I may mention here that this rock is a very good indication of gold. I have found it so in various parts of this colony, and in the part of Queensland under notice it is a prominent rock. Leichhardt noticed syenite at the head of the Lynd and on the Burdekin, in the hills below Mount M'Connell, which he thought was of domite, but Mr. Dalrymple has informed me it is granite. Mr. Gregory says that the summit of Mount M'Connell is marked by cliffs of porphyry, which also occurs on the right bank of the Suttor. These differences may be all reconciled, for syenite occasionally puts on a porphyritic appearance.)

"At the junction of Oxley Creek and the Flinders, on the east bank of the latter, cliffs of horizontal sandstone and conglomerate mark the boundary of what is called the 'desert country.' (Whether these rocks belong in part or at all to a carboniferous formation, Mr. Daintree does not state; but I have in my collections a coarse ferruginous quartz-grit from the table-land between the Cape and Flinders, and specimens of *coal* from the junction of Jardine's Creek, and fossilised wood from the delta of the Cloncurry and Flinders. These were brought to me by Mr. J. Atkinson. There is, therefore, a probability that coal-bearing beds do exist (a point on which Mr. Daintree expresses a doubt) below the fossiliferous secondary strata about O'Connell Creek, Walker's Creek, and Richmond Downs.)

"The cliffs above alluded to run parallel with the Cape range, and form the southern boundary of the auriferous belt under discussion.

"The area thus to be worked as 'Cape Diggings' will be 70 miles long by from 10 to 15 broad.

"It is bounded on the north-west by the lava of Walker's Plains; on the north by the syenite between Fletcher's Creek and the Cape; on the south by the sandstone and conglomerate of the desert. The south-eastern boundary is not yet determined: but it will be in that direction that deep leads will have to be looked for, the country being in that region flat as far as the junction with the Campaspe and the Cape, a distance of 50 or 60 miles.

"There were in the middle of July about 100 miners at work in two gullies called Specimen and Golden. The former of these rises in Mount Remarkable, an isolated hill at the south-eastern formation of the auriferous range which extends from Mount Three Heads."

Mr. Daintree, after confirming some other views of my own, gives a brief statement of the occurrence of Silurian rocks in Queensland. His opinion is that the Upper Silurian forms a belt from Brisbane to Broad Sound, extending to Maryborough and Rockhampton, the dip being at a high angle to north-east, and the strike parallel with the coast. Somewhat lower come in the Canoona and other gold-fields south-west of Maryborough, where the same Upper Silurian beds occur. On Perry's Range, Upper Burdekin, the dip is to south-west. These occur on the horizon of the Canoona field and represent the western side of an anticlinal, the summit of which has gone to form a portion of the enormous carboniferous formation, and as proved by the quartz in my fossiliferous Wollumbilla and Fitzroy Downs' auriferous calcareous rock, a portion of the secondary formations that cover and conceal vast masses of the Lower Palæozoic or even older series of formations.

The only apparent difficulty in reconciling the age of the Silurian of the Broken River with that of the coast, is that the strike is there north to north-east, whilst to the south-eastward it is north-west. This difficulty may be overcome, if we regard the formation as mantling round a granitic axis. The slates of the Cape are represented as striking north-west, which ought to place them in the same category as the Silurian of the coast; the Broken River slates assume a more meridional direction.

I come now to a discovery by Mr. Daintree himself, in the extending of the northern gold-fields to the head of the Gilbert River. He says:—

"Although the area of the auriferous rocks is considerable both on the Cape and Clarke rivers, still it is small compared with the extent of the old metamorphic gold-bearing slates of the Upper Gilbert.

"The eastern tributaries of the Copperfield River, the western tributaries of M'Kinnon's Lynd, the western and eastern tributaries of Jardine's Einnasleigh River, all run through the mica-schists and other metamorphic formations."

This is in close confirmation of the brief geological notices of Gregory and M'Kinlay.

The strike of the rocks in this region appear to have a trend to the eastward, according to the observations of Mr. Gregory; and this is confirmed by Mr. Daintree, who remarks as follows:—"The watershed between the Einnasleigh and the Burdekin, with several of the Upper Burdedin branch creeks, afford rock sections similar in every respect to the Cape diggings. As the main strike of the formation is north-easterly, and mica-schists are said to crop out on the coast at Endeavour River, and again on several parts of the Louisiade Archipelago, I think we may safely infer that auriferous tracts are continuous throughout, sometimes by large tracts of a horizontal sandstone series of unknown age, as on the upper portions of Leichhardt's Lynd."

Perhaps these inferences may be modified: but I have always expected another gold-field in the north, about the 144th meridian, on the heads of the Mitchell waters and the Kennedy River; nor is it unlikely that at the back of the east coast there are patches of auriferous country as far as 13° s.

The formations about Endeavour River are grey granite, schist, talc-slate, with quartz and flinty slate abutting on the granite; hornblendic granite occurring in the Turtle Islands, off the coast, and in Lizard Island, whilst to the north of Endeavour River, west of Cape Flattery, a table-land comes in, with a trend to s.w. by w., and from 500 to 600 feet high. The coast about Cape Grafton consists of grey granite and a tourmaline rock of granitic character. Northward, in Trinity Bay, contorted talc-schist, with quartz veins occurs, dipping 60° to s.w. This gives a strike about n.n.w. Mica-slate, contorted, occurs in the Barnard Islands to the south. Granite also occurs at Cape Melville and at Cape Direction, with flinty rock at Cape Sidmouth, and trap between it and the mouth of the Kennedy, both occurring with granite. Quartz also occurs abundantly in the neighbourhood of Cleveland Bay, at the back of which gold has been found. The general character of the coast of the York Peninsula to the 13th parallel is, therefore in agreement with the country six degrees more south and to the east of the Burdekin. I have not been able to have any of the rocks in the region just named subject to assay; but with respect to those of the Louisiade Archipelago, certain of them, especially the quartz, were assayed for me at the Mint some years ago, but without finding any gold in them. They consisted of slate, porphyry, &c.

Mr. Daintree goes on to say:—"I have not Leichhardt's work to refer to as to the Geology of Kirchner's Range, but since it lies in the strike of the Gilbert mica-schists, it is probably a schistose barrier."

On making reference, I find Leichhardt does not distinctly state what is its formation; but he mentions talc-schist to the south-east of it, with syenite passing into hornblende rock and with scattered quartz crystals. To the north-westward, granite and pegmatite occurred. The trend of the ranges on the east bank of the river appears to be north-easterly and easterly.

I suspect that there are two divisions of the old palæozoic rocks in the region under review, and that some of the supposed "metamorphic" rocks are transmuted Lower Silurian, or perhaps Huronian. If so, gold will, probably, be hereafter found.

Supposing that the preceding observations have been founded on sufficient data, then, regarding the general trend of the *divisio aquarum* from the granitic Bellenden Kerr Hills above Rockingham Bay, south-westerly through the heads of the Lynd and Gilbert to the ranges of Burke and Wills at the head of the Cloncurry, where quartz reefs are known to exist, I would venture to anticipate, hereafter, a development of auriferous country also in the neighbourkood of M'Kinlay's Range, and to the westward, especially as Wills points out a quartz reef, and as on Landsborough's country along the Gregory and O'Shanassy rivers, which also head along the previously indicated waterparting, there is abundance of basalt, which not only occupies a similar prominent position at the head of the Lynd, but also occurs in the Bramston Range, on the Flinders, and near to the head of the Barkly River, in an extensive table-land.

Independently of the well-known Peak Down or Mount Drummond mines, copper occurs at the Dee Mountain and in various other localities. Mr. Daintree, however, has added a fresh locality on the Lynd River.

The discoveries of gold and copper and other metals are not merely valuable to individual explorers, but belong to all the colonies in general. Those who work them, and those who profit by them, are of no particular section of the community, nor of any given member of the Australian provinces.

Copper, I may say, is very extensively developed; and iron still more so. The latter metal is, we already know, extremely abundant in Queensland, and magnificent specimens of ore from the neighbourhood of Port Curtis were exhibited in Paris at the first French International Exhibition. There are also in New South Wales vast masses of iron of far more solid character than the Fitzroy ore; and such I found in the explorations I made through the colony fifteen or sixteen years ago.

Looking at the whole of the phenomena represented by the features of that region, it is certain that Nature has been there in a very active state producing such combinations of galvanic, magnetic, and chemical forces. The iron also forms solid hills and cliffs rising out of a desert to 50 and 60 feet in broad ridges, and appearing under most picturesque forms. Imagine an explorer passing a night in a cavern in the very heart of a cliff of iron! The copper before us seems very much akin to that which occurs on Lake Superior in North America. Its hade is to the west; that of Peak Downs is to the south, and that of Daintree's Lynd mine to E. 30° S. Inferences from what has been said in relation to the age of the formations in which these deposits occur may be drawn respecting the new finds.

The Lake Superior copper rocks are, however, Silurian. It is probable that the new copper mine in question may belong to a lower stage, perhaps as low as the Cambrian or (Huronian) itself. In each case eruptive rocks are present. Granite and mica-slate, with quartz veins holding micaceous iron and pyrites, are common rocks in the vicinity.

As showing how generally copper exists in the interior, we may notice that M'Kinlay mentions his having found copper during his journey through the wilderness.

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149, Strand, London, W.C., July 1, 1868.

* Mr. TENNANT held the appointment of Lecturer on Geology and Mineralogy at Woolwich for seventeen years; the Lectures were discontinued in December last, Lectures on Military [illegible] substituted.

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PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED JULY 15TH, 1868.]

SESSION 1867–68.

Ninth Meeting, March 23rd, 1868.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Philip P. Blyth, Esq.* (J.P. for Middlesex); *Gilchrist Clark, Esq.; Charles Cornish-Brown, Esq.; James Douglas, Esq.; Capt. N. D. C. F. Douglas; John Lee, Esq.; John Moffitt, Esq.; Archibald Gilchrist Potter, Esq.; Thomas F. Quin, Esq.; Alderman David H. Stone; Howard Unwin, Esq.; Alexander Wilson, Esq.; James J. Wilkinson, Esq.; William Young, Esq.*

ACCESSIONS TO THE LIBRARY FROM MARCH 9TH TO MARCH 23RD, 1868.—'Plantæ Tinneanæ, sive Descriptio Plantarum in expeditione Tinneana ad flumen Bahr-el Ghasal, etc.' P. F. Tinné et J. A. Tinné. Donor, J. A. Tinné, Esq. 'History and Migration of Cultivated Narcotic Plants in Reference to Ethnology.' By J. Crawfurd, Esq. Donor, the author. 'Correspondence respecting Abyssinia, 1846-1868.' Parliamentary Paper. Purchased. 'Correspondence respecting Hostilities in the River Plate.' Parliamentary Paper. Purchased. 'Treatise on the Petroleum Zones of Italy.' By E. St. J. Fairman. Donor, the author. 'General View of the Frontier of Asia.' By M. Binieoff, St. Petersburg. Donor, the author.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING.—Map of the Republic of Nicaragua, by M. Sonnenstern. Presented by J. L. Hart, Esq., Consul-General. A Map showing the Route Survey of a Pundit from British India into Great Tibet through the Lhasa Territories and along the upper course of the Brahmaputra River. Presented by Captain T. G. Montgomerie, R.E., F.R.G.S. General Map of Europe, No. 12 of Stieler's Hand-Atlas. Map of the

Basin of the Nile, by Dr. G. Schweinfurth. Map of the Balkash Lake, &c., by Babkow and Golubew. All presented by A. Petermann.

H.R.H. the PRINCE OF WALES and suite honoured the meeting with their attendance, and remained to the end of the discussion.

The PRESIDENT opened the meeting by saying that, before the paper was read, he was sure the Fellows of the Society would feel that it was the duty of their President to express the sincere gratification of the meeting that their Vice-Patron the Prince of Wales had been pleased to honour them with his presence. As a veteran in the pursuits of science he well remembered what real interest the lamented Prince Consort took in attending scientific meetings, and how justly he appreciated the importance of the discussions which arose at them. It was most gratifying therefore to find the Prince of Wales treading in the footsteps of his illustrious father. The presence of his Royal Highness at one of their ordinary meetings was not inappropriate, inasmuch as he had himself travelled more extensively than any former heir to the crown of England, and they might feel certain that he has formed a high estimate of that predominant feature in our national character, the keen desire to explore distant lands. As geographers they might feel proud that another son of our beloved Queen, the Duke of Edinburgh, already enrolled as one of their honorary members, was making the grand tour of the British colonies, and would have seen, when he happily returned, more of the earth's surface than the great majority of practised travellers.

The following Paper was read:—

Report on the Trans-Himalayan Explorations, in connexion with the Great Trigonometrical Survey of India, during 1865-7: *Route-Survey made by Pundit ——, from Nepal to Lhasa, and thence through the upper valley of the Brahmaputra to its Source.* By Captain T. G. MONTGOMERIE, R.E., F.R.G.S.

[Extracts.]

A EUROPEAN, even if disguised, attracts attention when travelling among Asiatics, and his presence, if detected, is now-a-days often apt to lead to outrage. The difficulty of redressing such outrages, and various other causes, have, for the present, all but put a stop to exploration by Europeans. On the other hand, Asiatics, the subjects of the British Government, are known to travel freely without molestation in countries far beyond the British frontier; they constantly pass to and fro between India and Central Asia, and also between India and Tibet, for trading and other purposes, without exciting any suspicion.

In 1861 it was consequently proposed to take advantage of this facility possessed by Asiatics, and to employ them on explorations beyond the frontier. The Government of India approved of the project, and agreed to support it liberally.

With a view to carry out the above, Colonel Walker, the Superintendent of the Survey, engaged two Pundits, British subjects, from one of the upper valleys of the Himalayas. Such promising recruits having been secured, they were at once sent to the head-quarters of the Great Trigonometrical Survey, in order to be trained for Trans-Himalayan exploration.

On Colonel Walker's departure for England, these Pundits were put under Captain Montgomerie, who completed their training. They were found to be very intelligent, and rapidly learnt the use of the sextant, compass, &c., and before long recognised all the larger stars without any difficulty. Their work, from actual practice, having been found to be satisfactory, Captain Montgomerie directed them to make a route-survey from the Mansarowar Lake to Lhasa, along the great road that was known to exist between Gartokh and Lhasa. From Lhasa, they were directed to return by a more northerly route to Mansarowar. The route to Lhasa was selected by Captain Montgomerie, because it was known, from native information, to be practicable as far as the road itself was concerned. If explored, it was likely to define the whole course of the great river known to flow from near the Mansarowar Lake to beyond Lhasa. Hitherto the sole point on the upper course of this great river, the position of which was known with any certainty, was a point near Teshooloomboo, or Shigátze, as determined by Captain Turner in 1783. The position of Lhasa, the capital of Great Tibet, was, moreover, only a matter of guess, the most probable determination having been derived from native information as to the marches between Turner's Teshooloomboo and Lhasa. In fact, the route from the Mansarowar Lake to Lhasa, an estimated distance of 700 or 800 miles, was alone a capital field for exploration.

An attempt was made by the Pundits to advance direct from Kumaon, *viâ* Mansarowar, to Lhasa, but they did not find it practicable. The attempt by the Mansarowar Lake having failed, it appeared to Captain Montgomerie that the best chance of reaching Lhasa would be through Nepal, as the Nepalese Government has always maintained relations of some kind with the Government of Lhasa. Traders from Nepal, moreover, were known to visit Lhasa, and Lhasa traders to visit Nepal.

The Pundits were consequently ordered to go to Kathmandû, and from thence to try and make their way to the great road between the Mansarowar and Lhasa. Their instrumental equipment consisted of 2 large sextants,* 2 box sextants, prismatic and pocket compasses, thermometers for observing temperature of air and of boiling water, pocket chronometer, and common watch, with apparatus, the latter reduced as much as possible.

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* Only one large sextant was taken to Lhasa.

The Pundits started from Dehra, reached Moradabad on the 12th January, and Bareilly on the 23rd January, 1865. They crossed the Nepalese frontier at Nepalgunj, Jung Bahadur's new town, and from thence went by the Cheesaghurri road to Kathmandû, reaching the latter place on the 7th March, 1865.

In Kathmandû they made inquiries on all sides as to the best route to Lhasa; they found that the direct one by Kûti (or Nilum), across the Dingri plain (or Tingri Maidan, as it is called), was likely to be very difficult, if not impassable, owing to the snow at that early season (March, April). They consequently determined to try the route by Kirong, a small town in the Lhasa territory, as that route was said to be passable earlier than the Kûti route. Having made their arrangements, the Pundits started full of hope on the 20th March, 1865, accompanied by four men, whom they had hired as servants.

On the 26th they reached Medangpodo village, and here they changed their mode of dress to one better known to the people of Lhasa. They also gave out that they were Bisahiris,* and were going to buy horses, at the same time to do homage at the Lhasa shrine. The character of Bisahiris was assumed because they knew that those people had from time immemorial been privileged to travel in the Lhasa territory without question. On the 28th March they reached the neighbourhood of Kirong, but, much to their disappointment, they were stopped by the Chinese officials, who questioned them as to the object of their journey, and searched their baggage. Fortunately the instruments (which had been ingeniously secreted in a false compartment of a box) escaped detection; but still, though nothing suspicious was seen, the plausible reasons given for the journey did not satisfy the jealousy of the Chinese authorities. In spite of everything urged, they were not allowed to pass until a reference had been made to the Kirong governor. The Kirong governor seems at once to have noted the weak points of their story, and having pointed them out with inexorable logic, declined to let them pass on any consideration; they were therefore reluctantly forced to retrace their steps to Shabrû. At Shabrû the wily Pundit managed to persuade a high official that they were no impostors, and induced him, moreover, to certify that in a letter to the Kirong governor. Armed with this letter, they returned towards Kirong, with hopes of better luck, and no doubt, under ordinary circumstances, would have succeeded; but on the road they fortunately discovered that the Kirong governor was an individual who had known the Pundit's brother personally, when he was chief of Taglakote, near Mansarowar; his brother had in fact been frequently in close and friendly relations with him. This at once put a stop to all hopes of his advancing by the Kirong route, as the governor well knew he was no Bisahiri. The other Pundit thought of proceeding by himself, but, being able to devise no feasible method, he gave up the idea, and the party consequently marched back, reaching Kathmandû on the 10th April. Here they made fresh inquiries as to some more promising way of getting to Lhasa. At last they heard of two opportunities, the first by accompanying the camp of a new agent (vakeel) that Jung Bahadur was about to send to Lhasa, and the second by accompanying a Bhot merchant. In order to increase their chances of success, they decided that one should go with the Nepal agent, and the other with the merchant. The vakeel at first agreed to take one of them with him, but ultimately refused.

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* From the British valley of that name north-east of Simla.

Failing with the vakeel, it was impossible for the Pundit, who was known to the Kirong governor, to go with the Bhot merchant, as he intended to take the Kirong route; he consequently decided to try a more circuitous route, by Muktináth, but in this he failed, owing, according to his own account, to loss of health and the unsafe state of the roads, but, no doubt, in a great measure due to his own want of determination. After a long journey through the upper parts of the Nepal territory, he returned to British territory. The account of his proceedings is referred to separately. The other Pundit, at first, was not much more successful with the merchant than his brother had been with the vakeel. The merchant, Dawa Nangal, promised to take the Pundit to Lhasa, and on the strength of that proceeded to borrow money from him. The merchant, however, put off starting from day to day, and eventually the Pundit had to start with one of the merchant's servants, the merchant himself promising to follow in a few days. The Pundit assumed the dress of a Ladáki, and, to complete his disguise, added a pig-tail to his head. This change was made because he was afraid that the Kirong officials who stopped him the first time might recognise him again.

By this means he reached Tadúm monastery, a well-known halting-place on the great road between Lhasa and Gartokh. Starting on the 13th August from Kirong, he reached Lue on the 23rd. From Kathmandû up to this point vegetation and jungle had been abundant, but, beyond, the mountains were throughout bare and all but barren.

On the 24th August the Pundit joined a large trading party, travelling *viâ* Tadúm to Mansarowar, and was allowed to accompany them. On the 30th he reached Talla Labron, and there first caught sight of the great river* that flows towards Lhasa. His first acquaintance with this river was calculated to inspire him with respect for it, as three men were drowned in front of him by the swamping of a ferry-boat. Alarmed by this occurrence, the party marched a short distance farther up the river to a better ferry, by which they crossed in safety to the Tadúm monastery on the 6th of September. At Tadúm the Pundit feigned sickness as a reason for not going on to Mansarowar, and he was accordingly left behind. Continuing to feign illness, he at last found an admirable opportunity of going to Lhasa, viz., by accompanying a Ladák merchant in the employ of the Kashmir Maharaja, who was that year going to Lhasa, and was to pass through Tadúm. On the 2nd of October the merchants' head man, Chiring Nirpal, arrived, and on hearing the Pundit's story, at once consented to take him on to Lhasa. Starting on the next morning with the Ladáki camp, he marched eastward along the great road, reaching the town of Sarkajong on the 8th October. So far everything had gone smoothly, but here the inquiries made by the authorities rather alarmed the Pundit, and as his funds, owing to the great delays, had begun to run short, the two combined made him very uneasy. However, he manfully resolved to continue his journey. He became a great favourite with Chiring Nirpal and the whole of the Ladáki camp. On the 19th October they reached Ralang. From Tadúm to this point no cultivation was seen, but here there was a little, and a few willow-trees, and onwards to Lhasa cultivation was met with nearly every day.

On the 29th October they reached Digarcha, or Shigátze, a large town on the Penanangchú River near its junction with the great Nárichú River. The only incident during their long stay there was a visit that he and the Ladákis paid to the great Tashilumbo monastery. This monastery lies about half a mile south-west of the city, and is the same as that visited and fully described by Turner. The Pundit would rather not have paid the Lama a visit, but he thought it imprudent to refuse, and therefore joined the Ladákis, who were going to pay their respects to him. The Pundit confesses that, though personally a follower of Brahma, the proposed visit rather frightened him, as, according to the religion of his ancestors, who were Budhists, the Lama ought to know the secrets of all hearts. However, putting a bold face on the matter, he
and was much relieved to find that the Lama, a boy of

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* The Brahmaputra.

asked him three simple questions, and was, according to the Pundit, nothing more than an ordinary child, and did not evince any extra intelligence. At Shigátze the Pundit took to teaching Nepalese shopkeepers the Hindoo method of calculation, and thereby earned a few rupees.

The great road, which had hitherto been more or less close to the great Nárichú River, from Shigátze goes considerably south of that river. On the 25th December they reached the large town of Gyangze, on the Penanangchú River, which was then frozen hard enough to bear men. Crossing the lofty Kharola mountains, they arrived on the 31st December at Nang-ganchejong, a village on the Yamdokcho Lake, with the usual fort on a small hill. For two days the Pundit coasted along the Great Yamdokcho Lake.* On the second day he nearly fell a prey to a band of robbers, but, being on horseback,† he managed to escape, and on the 2nd January reached Demálang, a village at the northern angle of the lake. From Demálang the lake was seen to stretch some 20 miles to the south-east. The Pundit estimated the circumference of the lake to be 45 miles, but, as far as he saw, it was only 2 to 3 miles in width. He was informed that the lake encircled a large island, which rises into low rounded hills 2000 or 3000 feet above the surface of the lake. These hills were covered with grass up to the top. Between the hills and the margin of the lake several villages and a white monastery were visible on the island. The villagers keep up their communication with the mainland by means of boats. The Pundit was told that the lake had no outlet, but, as he says its water was perfectly fresh, that is probably a mistake; if so, the Pundit thinks the outlet may be on the eastern side, where the mountains appeared to be not quite so high as those on the other sides. The evidence as to the lake encircling a very large island is unanimous. Almost all former maps, whether derived from the Chinese maps made by the Lamas, or from native information collected in Hindustan, agree in giving the island a very large area, as compared with the lake in which it stands. This is, however, a very curious topographical feature, and as no similar case is known to exist elsewhere, it might perhaps be rash to take it for granted, until some reliable person has actually made the circuit of the lake. Meantime the Pundit's survey goes a considerable way to confirm the received theory. The lake, from the Pundit's observations, appears to be about 13,500 feet above the sea;

[illegible] of [illegible]

[illegible] ned, said that the paces of [illegible] his return journey.

it contains quantities of fish. The water was very clear, and said to be very deep.

The island in the centre must rise to 16,000 feet above the sea, an altitude at which coarse grass is found in most parts of Tibet.

From the basin of the Yamdokcho Lake the party crossed over the Khambala mountains by a high pass, reaching the great Nárichú (the Brahmaputra) at Khambabarche; from thence they descended the river in boats to Chusul village. Near Chusul they again left the great river, and ascending its tributary, the Kichu Sangpo or Lhasa River, in a north-easterly direction reached Lhasa on the 10th of January, 1866.

The Pundit took up his abode in a sort of caravanserai with a very long name, belonging to the Tashilumbo monastery; he hired two rooms that he thought well suited for taking observations to stars, &c., without being noticed. Here he remained till the 21st of April, 1866. On one occasion he paid a visit to the Golden Monastery, two marches up the great road to China, which runs from Lhasa in a north-easterly direction. He also attempted to go down the Brahmaputra, but was told that it was impossible without a well-armed party of a dozen at least. His funds being low, he was obliged to give up the idea, and indeed, judging from all accounts, doubted if he could have done it with funds. The Pundit's account of the city of Lhasa agrees, in the main, with what has been written in Messrs. Huc and Gabet's book as to that extraordinary capital, which the Pundit found to be about 11,400 feet above the sea. He particularly dwells upon the great number, size, and magnificence of the various monasteries, and the vast number of monks, &c., serving in them.

Having been so long away, the Pundit's funds had arrived at a very low ebb, and he was obliged to make his livelihood by teaching Nepalese merchants the Hindoo method of accounts. By this means he got a little more money, but the merchants, not being quite so liberal as those of Shigátze, chiefly remunerated him by small presents of butter and food, on which he managed to subsist. During his stay in Lhasa the Pundit seems to have been unmolested, and his account of himself was only once called in question. On that occasion two Mahomedans of Kashmiri descent managed to penetrate his disguise, and made him confess his secret. However, they kept it faithfully, and assisted the poor Pundit with a small loan, on the security of his watch. On another occasion the Pundit was surprised to see the Kirong governor in the streets of Lhasa. This was the same official that had made so much difficulty about letting him pass Kirong; and as the Pundit had (through Chúng

Chú) agreed to forfeit his life if, after passing Kirong, he went to Lhasa, his alarm may easily be imagined. Just about the same time the Pundit saw the summary way in which treachery was dealt with in Lhasa: a Chinaman, who had raised a quarrel between two monasteries, was taken out and beheaded without the slightest compunction. All these things combined alarmed the Pundit so much that he changed his residence, and from that time seldom appeared in public.

Early in April the Pundit heard that his Ladáki friends were about to return to Ládak with the tea, &c., that they had purchased. He forthwith waited on the Lopchak, and was, much to his delight, not only allowed to return with him, but was told that he would be well cared for, and his expenses paid *en route*, and that they need not be repaid till he reached Mansarowar. The Pundit, in fact, was a favourite with all who came in contact with him.

On the 21st April he left Lhasa with the Ladáki party, and marching back by the great road as before, reached Tadúm monastery on the 1st of June.

From Tadúm he followed the great road to Mansarowar, passing over a very elevated tract of country from 14,000 to 16,000 feet above the sea, inhabited solely by nomadic people, who possess large flocks and herds of sheep, goats, and yaks. On the road his servant fell ill, but his Ladáki companions assisted him in his work, and he was able to carry it on. Crossing the Mariam-La mountains, the watershed between the Brahmaputra and the Sutlej, he reached Darchan, between the Mansarowar and the Rakas Tâl, on the 17th of June. Here he met a trader from British territory who knew him, and at once enabled him to pay all his debts, except the loan on his watch, which was in the hands of one of the Ladákis. He asked his friends to leave the watch at Gartokh till he redeemed it.

At Darchan the Pundit and his Ladáki companions parted with mutual regret; the Ladákis going north towards Gartokh, and the Pundit marching towards the nearest pass to the British territory, accompanied by two sons of the man who had paid his debts.

The Pundit's servant, a faithful man from Záskar in Ladák, who had stuck to him through the journey, being ill, remained behind. He answered as a sort of security for the Pundit, who promised to send for him, and at the same time to pay all the money that had been advanced. Leaving Darchan on the 20th June, the Pundit reached Thájung on the 23rd, and here he was much astonished to find even the low hills covered with snow in a way he had never seen before. The fact being that he was approaching the outer Himalayan chain, and the ground he was on (though lower than much of the country he had crossed earlier in the season) was close enough to the outer range to get the full benefit of the moisture from the Hindustan side. The snow rendered the route he meant to take impracticable, and he had to make a great détour. After an adventure with the Bhotiyas, from whom he escaped with difficulty, he finally crossed the Himalayan range on the 26th June, and thence descended into British territory after an absence of 18 months. As soon after his arrival as possible, the Pundit sent back two men to Darchan, with money to pay his debts, and directions to bring back his servant. This was done, and the servant arrived all safe, and in good health.

The Pundit met his brother, who, failing to make his way to Lhasa, had returned by a lower road through the Nepalese territory. This brother had been told to penetrate into Tibet, and, if possible, to assist the Pundit. The snow had, however, prevented him from starting. He was now, at the Pundit's request, sent to Gartokh to redeem the watch, and to carry on a route-survey to that place. The Pundit handed over his sextant, and told him to connect his route with the point where the Bhotiyas had made the Pundit leave off. The brother succeeded in reaching Gartokh, redeemed the watch, and after making a route-survey from the British territories to Gartokh and back, he rejoined the Pundit, and they both reached the head-quarters of the Survey on the 27th of October, 1866.

During the regular survey of Ladák, Captain Montgomerie had noticed that the Tibetans always made use of the rosary and prayer-wheel,* he consequently recommended the Pundit to carry both with him, partly because the character of a Budhist was the most appropriate to assume in Tibet, but, still more, because it was thought that these ritualistic instruments would (with a little adaptation) form very useful adjuncts in carrying on the route-survey.

It was necessary that the Pundit should be able to take his compass bearings unobserved, and also that, when counting his paces, he should not be interrupted by having to answer questions. The Pundit found the best way of effecting those objects was to march separate, with his servant either behind or in front of the rest of the camp. It was of course not always possible to effect this, nor could strangers be altogether avoided. Whenever people did come up to the Pundit, the sight of his prayer-wheel was generally sufficient to prevent them from addressing him. When he saw any one approaching, he at once began to whirl his prayer-wheel round, and as all good Budhists whilst doing that are supposed to be absorbed in religious contemplation, he was very seldom interrupted.

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* The mani-chuskor, or prayer-wheel.

The prayer-wheel consists of a hollow cylindrical copper box, which revolves round a spindle, one end of which forms the handle. The cylinder is turned by means of a piece of copper attached by a string. A slight twist of the hand makes the cylinder revolve, and each revolution represents one repetition of the prayer, which is written on a scroll kept inside the cylinder.* The prayer-wheels are of all sizes, from that of a barrel downwards; but those carried in the hand are generally four or six inches in height by about three inches in diameter, with a handle projecting about four inches below the bottom of the cylinder. The one used by the Pundit was an ordinary hand one, but instead of carrying a paper scroll with the usual Budhist prayer "Om mani padmi hom," the cylinder had inside it long slips of paper, for the purpose of recording the bearings and number of paces, &c. The top of the cylinder was made loose enough to allow the paper to be taken out when required.

The rosary, which ought to have 108 beads, was made of 100 beads, every tenth bead being much larger than the others. The small beads were made of a red composition to imitate coral, the large ones of the dark corrugated seeds of the udrâs. The rosary was carried in the left sleeve; at every hundredth pace a bead was dropped, and each large bead dropped, consequently, represented 2000 paces. With his prayer-wheel † and rosary the Pundit always managed one way or another to take his bearings and to count his paces.

The latitude observations were a greater difficulty than the route-survey. The Pundit required to observe unseen by any one except his servant; however, with his assistance, and by means of various pretences, the Pundit did manage to observe at thirty-one different places. The Pundit had invested in a wooden bowl,‡ such as is carried at the waist by all Bhotiyas. This bowl is used by the Bhotiyas for drinking purposes; in it they put their water, tea, broth, and spirits, and in it they make their stirabout with dry flour and water, when they see no chance of getting anything better. The Pundit, in addition, found this bowl answer capitally for his quicksilver, as its deep sides prevented the wind from acting readily on the surface. Quicksilver is a difficult thing to carry, but the Pundit managed to carry his safely nearly all the way to Lhasa, by putting some into a cocoa-nut, and by carrying a reserve in cowrie-shells closed with wax. At Piáhtejong, however, the whole of his quicksilver escaped by some accident; fortunately he was not far from Lhasa, where he was able to purchase more. The whole of his altitudes were taken with the quicksilver.

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* This prayer is sometimes engraved on the exterior of the wheel.

† The Pundit found this prayer-wheel free of all examination by custom-house or other officials. In order to take full advantage of this immunity, several copper prayer-wheels have been made up in the workshop of the Survey, fitted for compasses, &c.: these will be described hereafter.

‡ The Tibetans are very curious as to these drinking bowls or cups; they are made by hollowing out a piece of hard wood, those made from knots of trees being more especially valued. A good bowl is often bound with silver. The wood from which they are made does not grow in Tibet, and the cups consequently sell for large amounts.

Reading the sextant at night without exciting remark was by no means easy. At first a common bull's-eye lantern answered capitally, but it was seen and admired by some of the curious officials at the Tadúm monastery, and the Pundit, who said he had brought it for sale, was forced to part with it, in order to avoid suspicion. From Tadúm onwards a common oil-wick was the only thing to be got. The wind often prevented the use of it, and, as it was difficult to hide, the Pundit was at some of the smaller places obliged to take his night observation, and then put his instrument carefully by, and not read it till the next morning; but at most places, including all the more important ones, he was able to read his instrument immediately after taking his observations.

The results of the expedition delivered at the head-quarters consist of—

1st.—A great number of meridian altitudes of the sun and stars, taken for latitude at thirty-one different points, including a number of observations at Lhasa, Tashilumbo, and other important places.

2nd.—An elaborate route-survey, extending over 1200 miles, defining the road from Kathmandû to Tadúm, and the whole of the Great Tibetan road from Lhasa to Gartokh, fixing generally the whole course of the great Brahmaputra River, from its source near Mansarowar to the point where it is joined by the stream on which Lhasa stands.

3rd.—Observations of the temperature of the air and boiling water, by which the heights of thirty-three points have been determined, also a still greater number of observations of temperature, taken at Shigátze, Lhasa, &c., giving some idea of the climate of those places.

4th.—Notes as to what was seen, and as to the information gathered during the expedition.

The latitude observations were taken with a large sextant of 6-inch radius, and have been reduced in the Computing Office of the Survey. There is no doubt but that the Pundit is a most excellent and trustworthy observer. In order to see this it is only necessary to look at the accompanying list.

Between the Mansarowar Lake and Lhasa the Pundit travelled by the great road called the Johng-lam * (or Whor-lam), by means of which the Chinese officials keep up their communications, for 800 miles along the top of the Himalayan range; from Lhasa, north of Assam, to Gartokh, north-east of Simla. A separate memorandum is given hereafter as to the stages, &c., on this extraordinary road. Starting from Gartokh on the Indus, at 15,500 feet above the sea, the road crosses the Kailas range by a very high pass, descends to about 15,000 feet in Narí Khorsum, the upper basin of the Sutlej, and then coasting along the Rakas Tâl, the Mansarowar, and another long lake, rises gradually to the Mariham-la Pass, the watershed between the Sutlej and Brahmaputra, 15,500 feet above the sea. From the Mariham-la the road descends gradually, following close to the north of the main source of the Brahmaputra, and within sight of the gigantic glaciers, which give rise to that great river. About 50 miles from its source the road is for the first time actually on the river, but from that point to Tadúm it adheres very closely to the left bank. Just before reaching Tadúm the road crosses a great tributary, little inferior to the main river itself. The Tadúm monastery is about 14,200 feet above the sea.

In many parts there appears to have been considerable danger of losing the road in the open stretches of the table-land, the whole surface looking very much like a road; but this danger is guarded against by the frequent erection of piles of stones, surmounted with flags on sticks, &c. These piles, called lapcha by the Tibetans, were found exceedingly handy for the survey; the quick eye of the Pundit generally caught the forward pile, and even if he did not, he was sure to see the one behind, and in this way generally secured a capital object on which to take his compass bearings. The Tibetans look upon these piles partly as guide-posts, and partly as objects of veneration; travellers generally contribute a stone to them as they pass, or, if very devout and generous, add a piece of rag; consequently, on a well-used road, these piles grow to a great size, and form conspicuous objects in the landscape. Over the table-land the road is broad and wide enough to allow several travellers to go abreast; in the rougher portions the road generally consists of two or three narrow paths, the width worn by horses, yaks, men, &c., following one another. In two or three places these dwindle down to a single track, but are always passable by a horseman, and,

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* Lam means road in the Tibetan language.

indeed, only in one place, near Phuncholing, is there any difficulty about laden animals. A man on horseback need never dismount between Lhasa and Gartokh, except to cross the rivers.

The road is, in fact, a wonderfully well maintained one, considering the very elevated and desolate mountains over which it is carried. Between Lhasa and Gartokh there are twenty-two staging places, called Tarjums, where the baggage-animals are changed. These Tarjums are from 20 to 70 miles apart; at each, shelter is to be had, and efficient arrangements are organised for forwarding officials and messengers. Each Tarjum is in charge of an official, called Tarjumpá, who is obliged to have horses, yaks, and coolies in attendance whenever notice is received of the approach of a Lhasa official. From ten to fifteen horses, and as many men, are always in attendance night and day. Horses and beasts of burden (yaks in the higher ground, donkeys in the lower) are forthcoming in great numbers when required; they are supplied by the nomadic tribes, whose camps are pitched near the halting-houses.

Though the iron rule of the Lhasa authorities keeps this high road in order, the difficulties and hardships of the Pundit's march along it cannot be fully realised, without bearing in mind the great elevation at which the road is carried. Between the Mansarowar Lake and the Tadúm monastery the average height of the road above the sea must be over 15,000 feet, or about the height of Mont Blanc. Between Tadúm and Lhasa its average height is 13,500 feet; and only for one stage does the road descend so low as 11,000 feet, whilst on several passes it rises to more than 16,000 feet above the sea. Ordinary travellers with laden animals make two to five marches between the staging-houses, and only special messengers go from one staging-house to another without halting. Between the staging-houses the Pundit had to sleep in a rude tent that freely admitted the biting Tibetan wind, and on some occasions he had to sleep in the open air.

Bearing in mind that the greater part of this march was made in mid-winter, it will be allowed that the Pundit has performed a feat of which a native of Hindustan, or any other country, may well be proud.

From the Mansarowar Lake to Tadúm (140 miles) glaciers seem always to have been visible to the south, but nothing very high was seen to the north; for the next 70 miles the mountains north and south seem to have been lower, but further eastward a very high snowy range was visible to the north,* running for 120 miles parallel to the Raka Sangpo River. From Janglache to Gyangze the Pundit seems to have seen nothing high, but he notices a very large glacier between the Pennang Valley and the Yamdokcho Lake.

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* With a very high peak at its western extremity, called Harkiang. A very high peak was also noticed to the south, between the Raka and Brahmaputra valleys.

From the lofty Khamba-la Pass the Pundit got a capital view. Looking south he could see over the island in the Yamdokcho Lake, and made out a very high range to the south of the lake; the mountains to the east of the lake did not appear to be quite so high. Looking north, the Pundit had a clear view over the Brahmaputra; but all the mountains in that direction were, comparatively speaking, low, and in no way remarkable.

About Lhasa no very high mountains were seen, and those visible appeared to be all about the same altitude. Hardly any snow was visible from the city, even in winter.

Extracts from the Pundit's Diary.

"*Jan. 26th*, 1866.—Reached Lhásá. It was my wish now to follow the course of the Brahmaputra River, but I was informed that unless I went with a well-armed party of at least a dozen, it would be dangerous to proceed.

"The city of Lhásá is circular, with a circumference of 2½ miles. In the centre of the city stands a very large temple, called by three different names. The idols in it are richly inlaid with gold and precious stones.

"The city stands in a tolerably level plain, surrounded by mountains, the level or open ground extending about 6 miles on the east, 7 on the west, 4 on the south, and 3 on the north. I accompanied the Ladák merchant, called Lopchak, on the 7th of February, to pay homage to the Gewáring-bo-che (the Great Lámá of Tibet), in the fort, ascending by the southern steps. A priest came out to receive us, and we were conducted into the presence of the Gewáring-bo-che, a fair and handsome boy of about thirteen years, seated on a throne six feet high, attended by two of the highest priests, each holding a bundle of peacock feathers. To the right of this boy, and seated on a throne three feet high, was the rajah Gyálbo-Khuro-Gyágo, his minister. Numbers of priests in reverential attitudes were standing at a respectful distance from them. We were ordered to be seated, and after making offerings of silks, sweets, and money, the Lámá Gûrû put us three questions, placing his hand on each of our heads: 'Is your king well?' 'Does your country prosper?' 'Are you in good health?' We were then served with tea, which some drank, and others poured on their heads, and after having a strip of silk, with a knot in it, placed by the priests round each of our necks, we were dismissed, but many were invited to inspect the curiosities that were to be seen in the fort. The walls and ceilings of all the chief houses in the fort, and all the temples that contained images in gold, were covered with rich silks.

"The Lámá Gûrû is the chief of all Tibet, but he does not interfere with state business. He is looked upon as the guardian divinity, and is supposed never to die, but transmigrates into any body he pleases. The dead body from which the Lámá Gûrû's soul has departed is placed in a gold coffin studded with the finest gems, and kept in the temple with the greatest care. The belief of the people is that the soul of one Lámá Gûrû is privileged to transmigrate thirteen times. The present Lámá Gûrû is now in his thirteenth transmigration. Churtans are placed over the coffins containing the Lámás' bodies, and it is said that these dead bodies diminish in size, while the hair and nails grow.

"The rajah, or gyalbo, is next to the Lámá Gûrû in rank; below him there are four ministers, called kaskak, who conduct all state business, under his orders. The Chinese vakeel at Lhásá, who is called ambán, has the power of reporting against either the rajah or the four ministers to the king of China, and, if necessary, can have them removed from office.

"The general belief of all the Tibetans is, that no sooner is the Lámá Gûrû born, than he speaks, and all withered plants and trees about his birthplace at once begin to bear green leaves. The moment news gets to the Lhásá court of such an occurrence, then the four ministers repair to the house, in order to ascertain the truth by the following method:—Articles of all descriptions are placed before the child, and he is requested to tell which belonged to the late Lámá Gûrû, and which did not. Should he be able to select from the articles put before him such of those that belonged to the Lámá Gûrû, then he is pronounced to be no impostor, and is forthwith carried away to the fort of Potoláh, and placed upon the throne as Lámá Gûrû.

"The Mahommedans of Lhásá gave me the following account as to the selection of the future Lámá Gûrû:—From the day of the death of a Lámá Gûrû all male births are recorded by the Lámás about the city, and the ministers are secretly informed of them. Names are given to the children, and on the thirtieth day after the decease of a Lámá Gûrû, slips of paper, each bearing the name of a child born within the month, are placed in a vessel; the chief of the four ministers then draws out one of the slips with a pair of pincers, and whichever child's name that bears, he is pronounced to be the future Lámá Gûrû. He is then taught all that is required of him by the priests, and when they think he has come to years of discretion, the previously-narrated ceremony of the choosing of articles is conducted. The people of Lhásá are kept in the dark as to this method of adopting a Lámá Gûrû. The Lhásá people are, by strangers, supposed to adopt a Lámá Gûrû, in order to prevent the government of the country from falling entirely into the hands of the Chinese.

" I observed that there was but little order and justice to be seen in Lhásá.

"The new year of this people commences with the new moon appearing on or about the 15th of February; they call it Lohsar. On New Year's Eve an order from the court goes round to have every house in the city cleaned; the houses are swept and whitewashed, and the streets are cleaned. On the day following, each household displays as many flags, &c., from the house-top as it can afford. Throughout the day and night singing, dancing, and drinking are kept up. On the second day of their new year all the people of the city assemble before the Potoláh fort, to witness the following feat, performed generally by two men :—A strong rope is fastened from the fort walls to strong rivets in the ground, 100 yards distant from the base of the fort. The two unfortunate men then have to slide down this rope, which very often proves fatal to them; should they, however, survive, they are rewarded by the court. The Lámá Gûrû is always a witness of the performance from the fort.

"From the commencement of the new year, whoever pays the highest sum is considered the judge of the rajah's court, and for twenty-three days he exercises his authority in the most arbitrary manner possible, for his own benefit, as all fines, &c., are his by the purchase. The purchaser of such authority must be one of the 7700 priests attached to the Debang monastery; the successful priest is called Jalno, and announces the fact through the streets of Lhásá in person, bearing a silver stick.

" The priests attached to all the temples and monasteries in the neighbourhood assemble in the fort, and offer homage. This assembling of the priests is called Molam Chambo, and the holidays go by the same name. The Jalno's men are now seen to go about the streets and places, in order to discover any conduct in the inhabitants that may be found fault with. Every house is taxed in Lhásá at this period, and the slightest fault is punished with the greatest severity by fines. The severity of the Jalno drives all the working classes out of the city, till the twenty-three days are over. The profit gained by the Jalno is about ten times the purchase-money. During the twenty-three days all the priests of the neighbourhood congregate at the Máchindránáth temple, and perform religious ceremonies. On the fifteenth day of the new year all the priests, assembling about Máchindránáth temple, display hundreds of idols in form of men, animals, trees, &c., and throughout the night burn torches, which illuminate the city to a great distance. The day on which the authority of the Jalno ceases, the rajah's troops parade through the streets, and proclaim that the power of the rajah has again been assumed by him. Twenty-four days after the Jalno ceases to have authority, he again assumes it, and acts in the same arbitrary manner as on the first occasion, for ten days, after which authority is once more assumed by the rajah. These ten days are called Chokchut Molam.

"On the first day the Lámás all assemble, as before, at Máchindránáth temple, and after a religious ceremony, invoke the assistance of their deities, to prevent sickness, &c., among the people, and, as a peace-offering, sacrifice one man. This man is not killed purposely, but the ceremony he undergoes often proves fatal. Grain is thrown against his head, and his face is painted half white, half black.

"On the tenth day of this vacation, all the troops quartered at Lhásá march to the temple, and form line before it. The victim, who has his face painted, is then brought forth from the temple, and receives small donations from all the populace assembled. He then throws the dice with the Jalno, and if the latter loses, it is said to forebode great evil, and if not, and the Jalno wins, then it is believed that the victim, who is to bear the sins of all the inhabitants of Lhásá, has been permitted by the gods to do so. He is then marched to the walls of the city, followed by the whole populace, and troops hooting and shouting, and discharging volleys after him. When he is driven outside the city, then people return, and the victim is carried to the Sáme monastery. Should he die shortly after this, the people say it is an auspicious sign, and if not, he is kept a prisoner at Sáme monastery for the term of a whole year, after which he is released, and is allowed to return to Lhásá.

"The day following the banishment of the man to Sáme, all the state jewels, gold and silver plate, &c., are brought out from the fort, and carried through the streets of Lhásá, protected by the troops armed, and followed by thousands of spectators. Towards evening everything is taken back to the fort, and kept as before. The day following, immense images of the gods (formed of variegated paper, on wooden frame-work) are dragged by men through the city, protected by armed troops. About noon the whole populace, great and small, assemble on the plain north of the city, and publicly carouse, race, and practise with the gun at targets. I was informed that the Molam Chambo and Chokchut Molam vacations, with all the religious ceremonies and observances, were instituted from time immemorial, but that the business of putting to the highest bid the powers of sole and chief magistrate, dates from the tenth transmigration of the soul of the present Lámá Gûrû.

"One crop only is raised here in the year. Seed is sown in April, and the crop is cut in September. There is no jungle hereabouts, and excepting one thorny bush, called Sia, the hills are absolutely barren.

"A very few of the rich men's houses are built of brick and stone, all others are of mud. Some few are built of sun-dried bricks, The manufactures of Lhásá are woollen cloths, felt, &c.

"The water supply of Lhásá is from wells, and a tax of two annas on every house is imposed monthly on the inhabitants for the use of the wells.

"During the month of December, merchants from all parts bring their merchandise here (from China, Tartary, Darchando, Chando, Khan, Tawang, Bhotan, Sikkim, Nepal, Darjiling, Azimabad and Ladák). From China, silks of all varieties, carpets and Chinaware. From Jiling, in Tartary, is brought gold-lace, silks, precious gems, carpets of a superior manufacture, horse-saddles, and a very large kind of Dumba sheep, also valuable horses. From Darchando immense quantities of tea—(Darchando is said to be situated north-east of Lhásá, and to be distant two months' journey). From Chando city, in the Kham territory, an enormous quantity of the musk perfume is brought, which eventually finds its way to Europe, through Nepal. Rice, and other grain that is foreign to Lhásá, is brought from Tawang, in Bhotan. From Sikkim, rice and tobacco; and from Nepal, Darjiling, and Azimabad, broad-cloth, silks, satins, saddles, precious stones, coral, pearls, sugar, spices, and a variety of Indian commodities. Charas and saffron (késar) come from Ladák and Kashmir. The merchants who come here in December, leave in March, before the setting in of the rains renders the rivers impassable. The inhabitants use ornaments of coral, pearls, and precious stones, and occasionally of gold and silver, which are more especially worn by women on their heads. Coats lined with the skins of sheep are generally worn.

"During the month of December, at nights and early in the mornings, the mercury in the thermometer sank below 32°, and during the days never rose over 40° to 45°. The River Kichu was frozen at that time of the year, and water kept in the warmest parts of a house, froze and burst the vessels holding it.

"The chief divinity worshipped is that of Budh.

"The food of the inhabitants consists chiefly of salted butter, tea, mutton, beef, pork, and fowls. Rice is not much eaten, owing to its high price, and because it is considered a fruitful source of disease. Other edibles, such as wheat, barley, and kitchen produce, &c., are cheap.

"To the north-east of Lhásá, distant about one month's journey, there is a country called Kham or Nyahrong. Thousands of the inhabitants of this country annually pay Lhásá a visit, some under the plea of wishing to worship, while others come with the ostensible reason of trading, but all really come with the object of robbing and stealing whatever they can. These people are held in terror by all the peaceable inhabitants of the Lhásá territory, who have named them Golok Khamba. Highway robbery and murder are perpetrated by them without compunction. They appear to be exempt from the wrath or punishment of the Lhásá chiefs. The Lhásá Government never takes notice of any complaints brought against this marauding tribe, and the reason I heard for this silence was that the Lhásá vakeel with government merchandise, on his annual journey to Pekin, has to pass through the territory appertaining to this tribe, and to insure a safe journey for these, the Government connives at the mischief done by them in the Lhásá territory. Another reason I heard was, that in case of a war, this Khamba tribe would render good service.

"North of Lhásá, and four miles distant, is situated a long hill, stretching from east to west, reported to contain immense quantities of silver; but a government order prohibits anyone from working the metal. The Government itself refuses to work the metal; for the general belief is, that the country will be impoverished, and the men will degenerate, should the metal be worked.

"Regarding the disposal of their dead, the Lhásá people of the poorer classes bind the corpses tightly with ropes, and place them erect against the inner walls of their houses for two or three days, while the richer and well-to-do classes detain the corpses in their houses for a length of fourteen days: after which time priests are invited, who pretend to read from their ritual the manner in which these corpses are destined to be disposed. Sometimes their decision is to cut the corpse into pieces, and scatter the fragments to the birds and beasts of prey, and sometimes to bury them. The reason assigned by them for detaining the bodies springs [illegible] the belief that they may become demons if disposed of with[illegible] blessings of the priests."

The Paper will be printed entire in the 'Journ

The PRESIDENT said that the communication wa importance to geographers; for although t known something of the great country of Tibet, and it had been visited at intervals by Europeans during the last two or three centuries, yet no account of its real geographical features, or of the exact position or altitude of any place, had ever been brought before the Society prior to the present journey of the Pundit. Missionaries reached the country in the 17th century, but no astronomical observations were made as to the position of places. In the time of Warren Hastings's presidency over our Indian Empire an expedition reached Tibet, but it brought back no observations for the accurate determination of positions. Even in so recent a time as Lord Canning's government in India, that excellent administrator determined upon an expedition into this region, but it was never carried into effect. It had been an opprobrium to Englishmen, that though this interesting region lay at no very great distance beyond the Himalaya Mountains, which had been admirably explored by English surveyors, they had never yet reached Tibet. The difficulties of penetrating the country had been forcibly described by Captain Montgomerie, without whose admirable and ingenious contrivance of instructing an intelligent native, and sending him in disguise, the Society would never have had this account of the country brought before them. The latitude of Lhasa had now been accurately determined, and this was one of the many geographical results of the exploration. Dr. Thomson, who had received a medal from the Society for his adventurous explorations in Ladak and the Karakorum Pass, and Dr. Campbell, the companion of Hooker, who had, from great elevations in Sikkim, looked over into the great region of Tibet, would be able to offer some important observations on the subject of the paper. Lord Strangford and Sir Henry Rawlinson, Asiatic scholars, who had studied the subject for a long time, would afterwards make some observations which would throw light not only upon this particular region, but upon the course of the great Brahmaputra River which flowed through the central portion of the country. Although that river was at so short a distance from the north of our Indian possessions, its course in passing through the Himalayan chain into Assam was not yet defined. This was one of the great geographical problems which remained to be solved.

Dr. Thomson said that he could add very little to the excellent remarks made by the President, who had appreciated the paper in a manner which must be most gratifying to all Himalayan travellers. He regarded with a feeling almost of envy the success of the Pundit in exploring a region from which Englishmen had, unfortunately, been debarred by the jealousy of the Chinese Government. English travellers had not been prevented from penetrating into Chinese Tibet by a want of enterprise, but entirely by the anxious desire of the Chinese Government to keep them out. For a long time the whole Himalayan chain, from Cashmere on the westward to Bhotan on the eastward, was independent of the British Government. It was only since the beginning of the present century that certain parts of it had become British territory; and even now Nepaul, which constituted nearly half of the whole extent of the chain, was, as much as Chinese Tibet, forbidden ground to English travellers,—Englishmen not being allowed to travel farther than the capital, Kathmandu; and it was only persons belonging to the embassy and one or two privileged persons who might be allowed to accompany it. Travellers had, however, been "nibbling" at Tibet in all directions; and, fortunately, about the year 1784—before the jealousy of the Chinese Government had been excited by the increasing power of the English Government in Hindustan—two official Englishmen were permitted to cross the Himalayan chain from Bhotan and to penetrate into Tibet as far as Shigatze and Gyanze. The observations made by them were the only careful explorations of Tibet Proper on record until the present account was given by the Pundit. Two distinguished travellers had, however, succeeded in penetrating a few miles into the southern portion of the country. These were Dr. Hooker, whose journey through Sikkim was so difficult and at the same time so successful, and Dr. Campbell, who accompanied him. These gentlemen were able, from the high elevation of Donkia and the mountains immediately to the north, to look over the whole of the enormous and comparatively flat country of the valley of the Brahmaputra; and as nearly as they could, without knowing the absolute distance, they measured the elevation of the immense mountains which lay to the north of the river, and now again seen by the Pundit. The President had commented on most of the points of interest in the paper. The curious lake Yamdokcho was still a vexed question; for as the Pundit had travelled only along one side of it, he had, as Captain Montgomerie well remarked in the paper, not satisfied us of the nature of the island which was said to occupy nearly its whole area. There was another lake marked to the westward, but about which there was also some doubt. It was evidently put down from native observations.

DR. CAMPBELL expressed his admiration of the extraordinary courage, perseverance, and zeal of the Pundit traveller. When he (Dr. Campbell) entered Tibet he was nearly murdered, having been seized, beaten, and imprisoned by order of the Sikkim chiefs, who had political objects of their own; but the officials who carried these intentions into effect had used violence with the desire of propitiating the Chinese authorities at Lhasa, with whom they were always intriguing. He travelled with Dr. Hooker over a pass, the elevation of which was 18,500 feet, and went twenty miles beyond into the interior of Tibet. The country was perfectly bare and nearly level. They ascended the hill called Bhomtso, and from that elevation they could distinctly see the beautiful mountain of Chomalari to the east, which was described by Turner, who penetrated as far as Shigatze. To the north and west they could see a very high range of mountains, which he believed had never before been noticed; but their observations on this subject were recorded in Dr. Hooker's journal. The Pundit said that this elevated range ran for 120 miles parallel to his route. Dr. Hooker, from the elevation on which he stood (at 18,500 feet), estimated it to be at least 24,000 feet.. It must be gratifying to Dr. Hooker now to find the Pundit had confirmed his conjectural geography. There was one point in the Pundit's account which was of great scientific interest, but still rather obscure. He stated that on approaching the Yamdokcho Lake he was informed the island which it contained occupied nearly the whole area of the lake, and he put it down at 16,000 feet high, giving the elevation of the lake itself at 13,000 feet above the level of the sea. The diameter of the island he stated to be two miles. He (Dr. Campbell) did not know what angle would be formed by a peak rising 3000 on a base of two miles diameter; but the information which he had obtained from native travellers at Darjeeling —hundreds of whom he had questioned—did not quite correspond with the statement of the Pundit. The island, according to them, did not fill the whole lake, only a corner of it. The island was frequently visited by pilgrims and others. Travellers also asserted that the water of the lake was brackish and dangerous to drink, but the Pundit maintained that it was sweet and good. In reference to the description of the election of the Grand Lama, it was scarcely credible that such an event should be so simply determined as by the throwing of the names of children into a hat, and the drawing of one name. He had known the office in less important monasteries than Lhasa to be vacant for years, in consequence of the whole body of Lamas being unable, through motives of self-interest or policy, to arrive at a decision.

Lord STRANGFORD said that Dr. Campbell had anticipated the chief portion of what he had to say. He had been for some time acquainted with the excellent paper which Dr. Campbell had written in the Journal of the Asiatic Society of Bengal, which gave an account of the country between Lhasa and

Bhotan. Dr. Campbell had not visited the country himself, but his account of it was one of the best instances which he (Lord Strangford) knew of rigorously critical exposition of merely hearsay information. It gave a most accurate delineation of the country, as was shown by the map annexed to the paper—the lake, however, being represented without that island girt with the ring now fully verified by the Pundit. The general impression of Tibet was that of a country ending two or three degrees eastward of Lhasa, and differing in its physical features from the country to the east: its table-land being there broken up by a succession of rivers and mountain ranges running north and south. There was no longer a system of plateaux and valleys bounded by low mountain ranges rising from an enormously high level; but, so far as was known, there were precipitous and frightful mountain ranges in a parallel series bounding the upper streams of great rivers flowing into China, or due south into Cambodia, or the Brahmaputra. This general impression is more or less correct as regards the physical geography of that country; ethnologically, however, or rather socially and politically, the whole of the country lying to the westward of China might more properly be divided by a line from east to west than one from north to south. The entire north of that line was Tibetan in language, but was inhabited by wild tribes and robbers; while the south was in just the same category as Tibet Proper, and its social condition was precisely analogous to that of the Lhasa country. The capital of this country is called Tsiamdo, corresponding to the Pundit's name of Chando, and its distance from Lhasa, given by him as a month's journey, corresponds with the thirty-five days' journey assigned it by the Chinese and Nepaulese itineraries. The province is called Kham, and it falls into the two divisions of settled and nomadic in just the same way as the province of U, or Tibet Proper, of which Lhasa is the capital. He had thought a great deal over the place mentioned as Jiling, without being able to identify it, and he could only suppose that the articles of trade mentioned in connection with it indicated that it belonged to a civilised country. He could not understand anything about that place, unless it were some part of China Proper,* the only country in the neighbourhood capable of manufacturing articles such as described.

In explanation of these statements he would refer to what had been before communicated to the world on this subject. The first authority was a Chinese work which appeared to have been written about the year 1780, and purported to be a detailed description of Tibet. It was translated into Russ by the Archimandrite Hyacinth. It had never appeared in an English form; but it had been translated into French by the celebrated traveller Klaproth, and had been printed in the French 'Journal Asiatique.' It had formed the pocket companion of the missionaries when they retraced the southern road; and they stated that they found it accurate. Their text would give the reader to understand that they travelled with the Chinese original in hand, which had been presented to them on their journey; and no doubt they did; but entire passages which they quote are given *verbatim* in Klaproth's words, as translated in the 'Journal Asiatique.' It was thus adopted and vouched for by Huc and Gabet, but then there arose the question, "Who will vouch for Huc and Gabet?" The necessary link was supplied by Mr. Bryan Hodgson, who was for some time resident in Kathmandu, in a most valuable contribution to the 'Journal of the Bengal Asiatic Society.' His paper was given him by the Maharajah of Nepaul as a keepsake, the donor knowing that it would be more appreciated by a man of science than any more material gift. It was an account of two embassies between Pekin and Kathmandu. It was a dry enumeration of the stages, the names of places, stations, bridges, fords, and mountains, and gave in a general way the features of the country. He (Lord Strangford) had gone through this paper and compared it throughout with the Chinese document translated in the 'Journal Asiatique,' and he found that the bulk of the names of the places described in the two papers were virtually identical. This was the more wonderful because the names were transcribed, on the one hand, from Chinese, which was a very difficult language for the expression of proper names, and, on the other hand, from Nepaulese. Huc and Gabet took thirty-five days on their journey to Chando in Kham, for example, while the Embassy route specified thirty-six stages; the various points being as regularly laid down as the stations of the North-Western Railway. The Chinese terminus of this road, so utterly unknown and unfixed as it is when taken as a whole, yet so minutely specified in its details, is the city called by the Embassy Tachindo, by the Chinese itinerary Ta-tsien-leu, and evidently the Pundit's Darchando. His Darchando is clearly this western frontier town of China, where there is a custom-house for arrivals from Tibet, and a fair held once a year as a tea-mart. Huc and Gabet described an iron bridge which was crossed at a certain time of the year. During the other portion of the year boats were used. In all these details there was a sort of omnilateral verification, and they constitute a very curious case of coincident information. The name of Golok Khamba, which was given to the robbers, was identical with the name which Huc and Gabet gave to the robbers on the north-east road. These robbers were called Kolo by Huc and Gabet, and were described as a most formidable impediment to trade. Khamba means people of Kham, the province due north of which would be the haunt of these robbers, who appear to infest the whole of these countries everywhere, if it be the case, as the Pundit says, that they flock to Lhasa in thousands in disguise as worshippers, and steal right and left. The Pundit's Nyahrong is the name of a tribe which was placed in exactly the same locality by Mr. Bryan Hodgson under the name of Gyarung. Hodgson was fortunate enough to meet with some natives of those inaccessible regions in Nepaul, where he measured the men from top to toe, and chronicled the colour of their hair and eyes and other features. He also took down their language, and compiled a very full grammar of it. The names by which the Tibetans knew the neighbouring countries, as yet impervious to us, helped to illustrate the ethnology of those countries. The Turks were there known by the name of Hor-pa, and the Mongolians by that of Sok-pa. The extent of the Mongolian settlements was known by the prevalence of the names significant in their language. Huc and Gabet mentioned that they crossed what he thought might be the Eastern analogue of the great Pamir plateau on the west, which appeared, when seen from the south, to be a high snowy range; but only after travelling about ten or twelve days were they able to clear it. They thus described it as a plateau rather than a range, and also as being, in their belief, the highest level ground on the earth. That opinion was also expressed by many other authorities. He (Lord Strangford) highly appreciated the praiseworthy sagacity and energy of Captain Montgomerie in conceiving and carrying out such a brilliant scheme as the special education of natives for the purpose of visiting countries which were inaccessible to Europeans; and he congratulated the Society upon the splendid and fruitful harvest of scientific result which had been yielded at the first sowing of the good seed.

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* Dr. Campbell suggested to the speaker that there was a Chinese town, called Tchiling-foo, on the north-western frontier of that country. In this case Jiling, or Tchiling, could hardly be other than the city of Sininfoo, close to the Koko Nor, on the Himalayan frontier—the north-eastern entrance of China from Tibet, as the city of Tachindo is the due eastern.

Sir HENRY RAWLINSON said he re-echoed the tribute of gratitude and admiration which Lord Strangford had expressed as due to Capt. Montgomerie. The value of native assistance was recognised from a very early period of our Indian empire; and native agency in the East had been employed from the time of Sir John Malcolm and Mr. Elphinstone for the purpose of acquiring political and statistical information. It was, however, reserved for Capt. Montgomerie to utilise the native element in another direction. It was he who first appreciated the capacity of the natives as scientific observers, and discovered that they could use a sextant and a theodolite as well as Europeans. That was really a most valuable discovery, which would enable geographers to make great advances in knowledge, by placing at their disposal surveyors who could be employed along our whole northern frontier in the solution of otherwise insoluble problems. There were in the paper a few points which he thought it desirable to explain popularly to the meeting. In the first place, he was constantly asked, "What is a pundit?" A pundit was not a very mysterious personage. The word simply meant one who had *read* the "shasters" or sacred books of the Hindoos. A pundit was simply then an educated Hindoo. He would be very valuable for the Buddhist countries, but he would be utterly useless in Mahommedan countries. When Capt. Montgomerie had to explore Mahommedan countries he very properly made use of a Mahommedan assistant in his survey. Last year the Society had from Capt. Montgomerie a very valuable communication, showing how by the aid of a Mussulman attached to the survey he had been able to connect Yarkand with the trigonometrical survey. At present all that had been done—and this was a very great step in advance—had been to survey the immediate line beyond our northern frontier; but in process of time they would extend their explorations and survey an outer line. The only considerable part of Asia which was now unknown, and which was unknown not only to the English and to the Russians, but even to the Chinese, was the country intervening in a direct line between Khotan and Lhasa. He hoped that the exploration of that country was reserved for English enterprise, or native enterprise directed by English intelligence. There was also another very interesting problem which must be solved sooner or later, and the sooner the better, namely, the course of the River Brahmaputra. It had been followed down carefully from its source in the Mansarowar Lake to Lhasa; but the part below Lhasa, where it turned to the south and descended through the mountain range to the plains of India, was still a mystery. It had never been visited. The Pundit would have attempted the journey if he had had a proper supply of money; but for want of funds he was unable to obtain an escort, and without that it would have been quite impossible to perform the journey. The route of the Pundit was not an absolutely new line, that is he was not the first traveller who had passed from Ladak to Lhasa. The line was partly travelled indeed by Andrada in the seventeenth century, and it was completely followed from one end to the other by Father Desideri in A.D. 1715; but the accounts of those travellers were sadly wanting in geographical interest. The most important feature, for instance, in Desideri's account was his description of the way in which he crossed the rivers, by holding on to a cow's tail. Having nothing else to commemorate, he filled pages of his narrative in insisting on the absolute necessity of cows to enable travellers to cross the rivers. Such was the style of geographical record and description with which the Jesuit accounts teemed. It was different with the English officers who were sent to Tibet by Warren Hastings. Mr. Bogle unfortunately died before he could publish the narrative of his journey; but his assistant, Mr. Stuart, communicated some details; and Major Turner, who led a subsequent mission to Tibet, had left a very valuable record of his observations, which were of the greatest importance both to geography and science. He (Sir Henry Rawlinson) had sometimes heard such explorations as those of the Pundit characterised as a useless and unjustifiable risk of life for the mere gratification of curiosity. He protested against any such doctrine; he maintained that the geographical discovery which was encouraged by the Society was not a mere dilettante object, or one pursued merely for the purpose of producing a sensation at the Geographical Society.

On the contrary, they encouraged explorations in Central Asia or Central Africa for a tangible purpose. Geographical discovery led to the spread of civilisation and general intelligence, and even to material advantage in the advancement of commerce and trade. He thus honestly believed that the Pundit's travels in Tibet had paved the way for the extension of our trade in that direction, and might hereafter prove of very great importance. There was, indeed, at the present time before the Geographical Society a paper by Mr. Forsyth, which pointed out the immense value of the countries beyond where the Pundit had been travelling in regard to the export and import trade of India. All that part of Asia formerly belonged to China, and was subjected to the same rigorous exclusiveness which was now practised in Tibet; but during the last three or four years Turkestan had become independent, and the intercourse with China was cut off. Now in that country they were desperate tea-drinkers, and drank that beverage morning, noon, and night; but since their rupture with China they were at their wit's end how to procure their tea. At the present time, indeed, tea grown in China, and intended for the country of which he was speaking, was first taken down to the coast, then round India to Bombay; thence it went to Kurrachee; thence up the Punjaub to Lahore; from Lahore it passed to Bokhara; from Bokhara it went on to Kashgar; and in that way only did it arrive at its destination. Now if Tibet and the neighbouring countries were thoroughly explored and civilised the tea might penetrate from India, if not from China, into Turkestan, by a hundred different channels. In return for the tea again there might be exported the *Turfan* wool which was produced in that country. It was the finest wool in the world, and was far better fitted than the produce of Tibet for the looms that wove the Cashmere shawls. It was almost impossible now to get the genuine wool in India, and consequently the weavers of the Punjaub diluted their wool with a Persian material from Kerman, which was much inferior, and the Cashmere shawls had in consequence greatly deteriorated in quality. Under the auspices of British geographers both trades might be improved. We might be able to supply the Turkestanis with tea, and they might be able to supply us in exchange with Turfan wool. He mentioned this case to show that there were practical advantages attending geographical exploration, and that it was not pursued in a mere dilettante spirit or for a mere visionary object. It would in reality prove of very great value in improving the social state of the East. The Pundit had further remarked upon the long stages of the road between Ladak and Lhasa, and had stated that the Tibetans kept up a very regular and rapid communication. It appeared, however, that they took 35 days to travel 800 miles, a rate of progress which any Eastern traveller who had been accustomed to ride post in Turkey and Persia would regard as perfectly childish. The regular Tartar rate of travelling was 100 miles a day, and this rate was kept up for fourteen or fifteen days in succession if necessary. Sir Henry had himself on several occasions ridden "Tartar" between Baghdad and Samson, and between Teheran and Meshed at this rate, and there was on record an instance of a famous Turkish courier, named Mustafá, having ridden from Constantinople to Demawend, beyond Teheran, a distance of 1700 miles in fourteen days, bringing to Sir Henry Willock the intelligence of Napoleon's escape from Elba. In these journeys the courier is never allowed to take any regular sleep, though he dozes sometimes on horseback. As to the use of the "prayer-wheel," he might explain that the prayer to be offered was pasted inside the wheel, so that turning round the wheel was equivalent to saying the prayer, and in this way an entire service might be got through in five minutes. The practice was an illustration of the ordinary tendency of the Tibetans to avoid trouble as far as possible.

Mr. Crawfurd said that he agreed entirely with the eulogium which had been passed upon the Pundit, and more particularly with that upon Captain Montgomerie, who educated him for the work. A pundit meant simply a learned man. But he must be a Brahmin. He (Mr. Crawfurd) had read that morning an account, written by a pundit, of the greatest native battle ever fought in India, that of Paniput. He strongly recommended its perusal. It was to be found in vol. iii. of the 'Transactions of the Asiatic Society of Bengal.' He was at a loss to understand where the commerce of Tibet was to be found. The country was a very poor and very sterile one. The only valuable thing which it produced was a shawl-wool, and of this the Brahmin took no notice. The wool which Sir Henry Rawlinson had mentioned as being of an excellent quality was only goat's hair. Their tea had been mentioned as being produced somewhere in Tartary. It was Chinese and horrible trash, and would produce a wash that would turn the stomach of a hog. He did not consider that the route which was described by Sir Henry for the transport of tea would be superior to the existing one.

MR. T. SAUNDERS stated that there was now no difficulty in obtaining the consent of the Chinese Government for any European to pass the British frontier into Tibet. He gave that information on the authority of Mr. Consul Morrison, who was thoroughly familiar with Chinese matters, and who had assured him that the restrictions existing on the Chinese frontier were only such as would exist on any frontier where passports were demanded. Passports might be readily obtained at Peking simply for asking. That fact was important, as it might spare the Pundit the necessity of risking his life in future explorations.* The latitude ascribed to Lhasa by the Pundit cor-

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* The following memorandum on this subject has been communicated to the Secretary by Mr. Morrison:—"It is to be regretted that the Topographical Department in India, under a mistaken supposition that the Chinese Government dislike foreigners to travel in their country, have thought it necessary to send agents across the Chinese frontier to make surveys in a clandestine manner, instead of openly. . . . . Travelling in China and Tartary is now perfectly easy and safe for British subjects provided with passports, and in their proper characters; but the want of passports must generally cause the detention of travellers, while the assumption of false characters (especially on the part of surveyors) must tend to excite suspicions in the minds of the Chinese, injurious to the friendly and confidential relations which have now subsisted for seven years between the British and the Chinese Governments.

"Since 1861 many British subjects, Americans, Frenchmen, Germans and Russians, have every year travelled over a large extent of eastern and central China and Tartary without meeting the slightest hindrance or molestation.

"The friendly disposition towards foreigners, equally of Chinese, Tartars, and Tibetans, is abundantly described in the books of Turner, Huc, Fortune, and others.

"Although persons may travel safely in China or Tartary without knowing the language of the country, the knowledge of at least a few words would be useful to enable travellers to dispel groundless fears, which sometimes are a cause of difficulty. This was exemplified in the case of Mr. Bickmore, whose paper was lately read before the Geographical Society.

"The stoppage at the frontier of travellers without passports need not be considered to indicate hostility to foreigners. It is done simply in compliance with municipal regulations, which are enforced more strictly against Chinese themselves than against foreigners. The restrictions on Europeans have been imposed, not by the Chinese, but by their own governments, in the interest of order, and to prevent a trade of very great value being jeopardised by the misconduct of evil-disposed persons.

"That the Chinese Government does not entertain towards foreigners the jealousy often ascribed to it, is proved by its readiness to employ foreigners in positions of trust, and where scientific qualifications are demanded. The present chief of the Chinese Maritime Customs is a British subject, having under him a staff of responded within three minutes of that reported by Williams. The course of the great Sampu River in the maps by D'Anville and the Jesuit missionaries, was well confirmed by the labours of the Pundit.

The PRESIDENT, in concluding the Meeting, stated that he could not more appropriately close the proceedings than by reading portions of a letter which he had received a few days ago from Captain Montgomerie. He wrote as follows:—

"MY DEAR SIR RODERICK, "Camp, Jugboorn, 29th Jan., 1868.

"I hope, by the time this reaches London, you will have received a copy of my Report on Trans-Himalayan Explorations, which Colonel Walker promised to send to you when ready.

"The explorations have been made on the plan which I initiated a few years ago, and of which I gave you the first results in the expedition by which the position and height of Yarkund were determined. The fruits of the present expedition are, I think, an improvement on those of the last, as they embrace a much larger tract of country.

"I hope the route surveyed will form a fairly accurate basis for the whole of Tibet, or of Great Tibet, as it is generally applied to the Lhasa territories.

"I wish I could present the Pundit to you in person. I am sure he would make a good impression anywhere, and I can quite understand his being an immense favourite with the Ladakis who convoyed him into the Sacred City. Without their assistance he would have found it a very much more difficult matter than he did, though it was difficult enough in every way. The Pundit, I think, deserves all praise; his work has stood every test capitally. The latitude observations are undeniably good, and in that respect the position of Lhasa is well within half a minute of the correct value. The longitude may be said to be true within about a quarter of a degree, and the height, 11,700 feet, some 200 or 300 feet probably in defect. Considering the great distance traversed, the longitude could hardly be much closer. The height has never been determined before; the latitude, even in Mr. Keith Johnston's last atlas, was given about one degree and a half in excess, if I remember right; while the longitude derived from the side of British India was nearer the mark.

"The old maps of Great Tibet give a great deal of detail, and they were supposed to be relatively correct in longitude, and to be tolerably correct in latitude. The Pundit's work, however, shows that this view was incorrect, and the old maps are not even tolerably correct in latitude. Some geographers had come to this conclusion a good many years ago, as they found that they could not reconcile the positions of Shigatze and Lhasa, as derived from Turner, with the positions assigned to those places in the old maps. The consequence was they omitted all details north of the Himalayas. This was going to the other extreme: for, judging by the Pundit's work, we may conclude that the old maps do, in a general sort of way, represent the large features,

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several hundreds of Europeans. The arsenal at Nanking and the dockyard at Foochow are respectively under British and French officers. One hundred and fifty years ago the great survey of the empire (an admirable one for the period) was made for the Chinese Government by European (chiefly French) mathematicians, who were allowed to send copies of it freely to Europe.

"It cannot be doubted that the Chinese Government would now be perfectly willing, if the proceeding were suggested to them, to undertake conjointly with the British Government an exploration to discover practicable routes between the Chinese territories and British India. They would no more object to an overland traffic by such routes than they have ever done to the traffic with Russia through Mongolia, or to that with Corea, Cochin-china, and Burmah.—*M. C. Morrison, March* 23."

though the accuracy, even relatively, is very small. The old maps, in fact, appear to have been compiled from eye-sketches supplied by the Lamas, and put together by other people as they received them, without any means of supplying accuracy. I should very much doubt if there was any attempt to determine the latitudes by the Lamas, and, as far as is known, no observations were taken in Tibet by any of the Jesuit missionaries; the said missionaries did, however, take the latitudes of several of the cities of Eastern Turkistan, and hence it was naturally concluded that they had done the same for Tibet.

"The shape of the Great Yamdokcho Lake was always a puzzle to me, but the Pundit saw more than half of it, and vows that it is of much the same shape as shown in old maps, viz. a narrow ring of water encircling a very large island. I am not aware of any other lake like it, and, as the Pundit did not go all the way round, it may be urged that it is doubtful; but all evidence on the subject is unanimous, or very nearly so.

"The road along the top of the Himalayas, at an average height of say 14,000 feet for 800 miles, is not a line which people would imagine commerce to be carried along; yet it is said to have been in use for centuries. The Pundit's ancestors were Budhists, and hence you can easily imagine his feelings when ushered into the Great Lama's presence, with his prayer-wheel stuffed with survey-notes and an English compass in his sleeve. Fortunately, he was not very closely examined; and, finding that his thoughts were not divined, he regained his nerve, and managed to take the dimensions of the Great Lama's residence and fort as he returned from the audience. I have given the Pundit's observations and measurements in full, so any one that wishes can examine into the merits of the work themselves.

"I have concluded my Report with a separate memorandum on the Brahmaputra River, which you may perhaps think worth discussing separately. I am trying to extend the explorations northward into the great blank between the Himalayas, Russia, and China Proper; and some day I hope to get a route carried down the great river from Lhasa to well-known parts of the world.

"Hoping the Pundit's labours may prove acceptable to the Geographical Society,

"I am yours very truly,

"T. G. Montgomerie."

Tenth Meeting, April 27th, 1868.

Sir RODERICK I. MURCHISON, Bart., K.C.B., President, in the Chair.

Elections.—*Captain W. B. Colvin; Lieutenant A. Combe; the Right Hon. Lord F. H. Kerr; Lieutenant W. S. A. Lockhart,* 14th Beng. Cav.; *Lieutenant Cecil W. E. Murphy,* R.A.; *Brigadier-General William L. Merewether,* C.B.; *William C. Scott, Esq.; Lieutenant-Colonel Harvey Tower; William Richard Winch, Esq.; F. T. Worsely-Benison, Esq.*

Accessions to the Library, March 23rd to April 27th, 1868.—Tod's 'Travels in Western India,' 1839. Boisgeslin's 'Malta,' 1805. Wicquefort's 'Voyages,' 1727. Olearius' 'Voyages Célèbres,' 1727. Mendez Pinto's 'Historia Oriental,' 1627. 'Voyages of M. Pinto,' 1645. Russell's 'Aleppo,' 1794. Thevenot's 'Voyages,'

1683. Doolittle's 'Social Life of the Chinese,' 1866. Ellis' 'Madagascar Revisited,' 1867. Knox's 'Ceylon,' 1817. Harkness' 'Neilgherry Hills.' Prinsep's 'Thibet,' 1852. Godet's 'Bermuda.' Charlevoix's 'Paraguay,' 1769. All purchased. Hughes' 'Class-book for Physical Geography,' 1868. Donor, the author. W. L. Jordan's '"Vis inertiæ," and a New Theory of the Tides,' 1868. Donor, the author. Ker Porter's 'Travels in Persia,' 1820. Donor, the Rev. T. C. Thornton.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING.—Ordnance Maps, on various scales; 980 sheets. Presented by the War Office, through Sir Henry James, R.E. A valuable collection of District Maps of India, in the Bengal Presidency, &c., 55 inches. Presented by Major J. Baillie, Bengal Staff. Map of part of Abyssinia, showing the progress of the British army. Presented by the War Office, through Sir Henry James, R.E. Map of the South-Eastern part of Abyssinia, from Addigerat to Magdala; also one from Tekonda to Addigerat, showing the fortress of Magdala. Presented by Dr. A. Petermann.

The following telegram relating to the recent victory of the British army in Abyssinia was read by the President:—

"26th April, 1868.

"*From the President and Council of the Berlin Gesellschaft für Erdkunde, to Sir Roderick Murchison, President of the Royal Geographical Society.*

"By despatch of Colonel Beauchamp Walker we receive, on celebrating the fortieth anniversary of our foundation, the telegraphic news of Magdala being taken; and we present our congratulations to the Royal Geographical Society for this new success of British valour, benefiting geographical science."

In announcing the receipt of letters from Dr. Livingstone, which were about to be read, the PRESIDENT said that in January last, when by the return of the Livingstone Search-Expedition his prediction respecting the great traveller was verified, and it had been ascertained, through the successful labours of Mr. Young and his associates, that Livingstone had not been killed near Lake Nyassa, he was so unwell that he could only express to the Society by letter the intense joy and gratification he experienced at this result. Now, indeed, we had fresh grounds for rejoicing—now that we had in our hands letters from Livingstone himself, written four months after the time when the deceitful scoundrels of Johanna said he was killed, and 400 miles to the north of the spot where, as the lying Moosa declared, he saw him fall under the axe of a Zulu Caffre. He (the President) had already had an ample reward in receiving the thanks of the Society for having seen through the false story of the Johanna deserters which produced such wide distress, and for having unflinchingly persevered in his endeavour to induce Her Majesty's Government to send out that expedition which brought to us the joyful tidings. He felt certain that Livingstone would succeed in exploring the interior of Africa; for he knew how to calculate upon his undaunted perseverance, his iron frame, and above all upon that peculiar gift which he so eminently possesses of attaching to him, wherever he goes, the Negro as his true friend. So, therefore, when it was reported by Arab traders who reached the east coast, that a white man had been seen to the south of the Lake Tanganyika, he felt sure that that man must be Livingstone, and now we have the proof of it in his own handwriting. After the reading of the despatches and letters, he would review the three possible routes which Livingstone might follow, and speculate upon the time which may elapse under each of these conditions, before he might, under Providence, bring his glorious labours to a happy end.

The following Letters from and Despatches relating to Dr. Livingstone were then read :—

1. *Letter to* SIR RODERICK MURCHISON.

"MY DEAR SIR RODERICK, "Bemba, 2nd February, 1867.

"This is the first opportunity I have had of sending a letter to the coast, and it is by a party of black Arab slave-traders from Bagamoyo, near Zanzibar. They had penetrated here for the first time, and came by a shorter way than we did. In my despatch to Lord Clarendon I give but a meagre geographical report, because the traders would not stay more than half a day; but, having written that through the night, I persuaded them to give me an hour or two this morning, and if yours is fuller than his Lordship's you will know how to manage. I mentioned to him that I could not go round the northern end of Lake Nyassa, because the Johanna men would have fled at first sight of danger; and they did actually flee, on the mere report of the acts of the terrible Mazitu, at its southern extremity. Had I got them fairly beyond the lake, they would have stuck to me; but so long as we had Arab slave-parties passing us they were not to be depended on, and they were such inveterate thieves it was quite a relief to get rid of them, though my following was reduced thereby to nine African boys, freed ones, from a school at Nassick, Bombay. I intended to cross at the middle of the lake, but all the Arabs (at the crossing station) fled as soon as they heard that the English were coming, and the owners of two dhows now on the lake kept them out of sight lest I should burn them as slavers. I remained at the town of Mataka, which is on the watershed between the sea-coast and the lake, and about 50 miles from the latter. There are at least a thousand houses [in the town], and Mataka is the most powerful chief in the country. I was in his district, which extends to the lake, from the middle of July to the end of September. He was anxious that some of the liberated boys should remain with him, and I tried my best to induce them, but in vain. He wished to be shown how to make use of his cattle in agriculture; I promised to try and get some other boys, acquainted with Indian agriculture, for him. This is the best point I have seen for an influential station; and Mataka showed some sense of right when his people went, without his knowledge, to plunder at a part of the lake,—he ordered the captives and cattle to be sent back. This was his own spontaneous act, and it took place before our arrival; but I accidentally saw the strangers. They consisted of fifty-four women and children, about a dozen boys, and thirty head of cattle and calves. I gave him a trinket in memory of his good conduct, at which he was delighted, for it had not been without opposition that he carried out his orders, and he showed the token of my approbation in triumph.

"Leaving the shores of the lake we endeavoured to ascend Kirk's range, but the people below were afraid of those above, and it was only after an old friend, Katosa or Kiemasura, had turned out with his wives to carry our extra loads that we got up. It is only the edge of a plateau peopled by various tribes of Manganja, who had never been engaged in slaving; in fact they had driven away a lot of Arab slave-traders a short time before. We used to think them all Maravi, but Katosa is the only Maravi chief we know. The *Kanthunda*, or climbers, live on the mountains that rise out of the plateau. The

Chipeta live more on the plains there; the *Echewa* still further north. We went west among a very hospitable people till we thought we were past the longitude of the Mazitu; we then turned north, and all but walked into the hands of a marauding party of that people. After a rather zigzag course we took up the point we had left in 1863, or say 20′ west of Chimanga's, crossed the Loangwa in 12° 45′ S., as it flows in the bed of an ancient lake, and after emerging out of this great hollow we ascended the plateau of Lobisa at the southern limit of 11° S. The hills on one part of it rise up to 6600 feet above the sea. While we were in the lowlands I could easily supply our party with meat, large game being abundant, but up on these highlands of the Babisa no game was to be found. The country, having become depopulated by the slaving in which the people engaged, is now a vast forest, with here and there, at wide intervals, a miserable hamlet. The grain is sown in little patches in the forest, and the people had nothing to sell. We had now a good deal of actual gnawing hunger, as day after day we trod the sloppy dripping forests, which yield some wretched wild fruits and lots of mushrooms. A woman can collect a load of half a hundredweight: after cooking they pound them into what they call porridge; but woe is me! they are good only for producing dreams of the roast beef of bygone days. They collect six kinds, and reject about ten, some as large as the crown of one's hat. When we got to the Chambeze, which was true to the character of the Zambesi, in having abundant animal life in its waters, we soon got an antelope on its banks. We crossed it in 10° 34′. It was flooded with clear water, but the lines of bushy trees which showed its actual banks were not more than forty yards apart. We arrived here (at Bemba) on the last day of January; it is a stockaded village with three lines of defence, the inner one having a deep dry ditch round it. I think, if I am not mistaken, that we are on the watershed we seek between the Chambeze and Loapula. I have not had any time to take observations, as it is the rainy season and almost always cloudy; but we shall rest a little here and get some flesh on our bones. We are about 10° 10′ S., 31° 50′ E. Altitude about 4500 feet above the sea. The Loapula, or Luapula, is said to be a very large river, but I hope to send fuller information from Tanganyika. I have done all the hunting myself, have enjoyed good health, and no touch of fever: but we lost all our medicine,—the sorest loss of goods I ever sustained; so I am hoping, if fever comes, to fend it off by native remedies, and trust in the watchful care of a Higher Power. The chief here seems a jolly frank person, but unless the country is insecure I don't see the use of his lines of circumvallation. He presented a cow on our arrival, and a huge elephant's tusk because I had sat on it.

"I have had no news whatever from the coast since we left it, but hope for letters and our second stock of goods (a small one) at Ujiji. I have been unable to send anything either; some letters I had written in hopes of meeting an Arab slave-trader, but they all 'skedaddled' as soon as they heard that the English were coming. I could not get any information as to the route followed by the Portuguese in going to Cazembe till we were on the Babisa plateau. It was then pointed out that they had gone to the westward of that which from the Loangwa valley seems a range of mountains. The makers of maps have placed it (the Portuguese route) much too far east. The repetition of names of rivers, which is common in this country, probably misled them. There are four Loangwas flowing into Lake Nyassa.

"Would you kindly say to Captain Richards that I had to draw some rifles and ammunition from H.M.S. *Wasp*, and I shall feel obliged if he makes that right.

"With kindest regards to Lady Murchison,

"I am, ever affectionately yours,

"DAVID LIVINGSTONE."

2. *Despatch to the* Earl *of* Clarendon, K.G.

[Transmitted by Lord Stanley, Her Majesty's Secretary of State for Foreign Affairs.]

"Bemba, lat. 10° 10′ s., long. 31° 50′ e.,
"February 1st, 1867.

"My Lord,

"On our arrival yesterday at this town, we found that a party of black Arab slave-traders was ready to start for Bagamoyo, near Zanzibar, and could remain only half a day to allow of our writing. The geographical matter must therefore be short.

"We could not go round the northern end of Lake Nyassa, as we intended, partly because the country had been swept of provisions by Zulu marauders, and partly because I felt sure that the Johanna men would flee at sight of danger, as they afterwards actually did, on mere report, at its southern end. By striking southwards we passed through a depopulated tract of about one hundred miles, but became acquainted with Mataka, the most influential chief on the watershed between the coast and the lake. His town consists of at least 1000 houses, and, the altitude above the sea being over 3000 ft., the climate is cold in July. Some of his people had gone to Lake Nyassa to plunder without his knowledge, and he had ordered the captives and cattle to be sent back. It was gratifying to find that this was his spontaneous act; and I accidentally got a sight of the party, and found it to consist of 54 women and children, a dozen boys, and about 30 head of cattle. We remained a considerable time in his town, and longer in his district, which extends down to Lake Nyassa, 50 miles distant. He was very anxious that some of the freed boys from Nassick school should remain with him to show the use that could be made of his cattle in agriculture, but I could not prevail on any one to remain. One had discovered two uncles in the town, but refused to live with them. 'How can I remain where I have no mother and no sister?' was his invariable answer to the request for him to stop. I promised to endeavour to get some lads from the same school, who had acquired a knowledge of Indian agriculture, to show him how to make and use ploughs.

"Mataka provided amply for our wants and safety while in his district; but he could not control the Arabs, who have placed two dhows on the lake, and kept them out of our reach lest we should burn them as slavers. I was therefore forced to go round the southern extremity of the lake, instead of across the middle. There we visited the three most important Waijan chiefs, and those who are still the greatest slave-traders in the country. I do not know what effect, if any, our protests and explanations will have, but it seemed to be the first time they had heard their conduct condemned. They were very hospitable; and then an Arab, belonging to a slaving-party which had been plundered of its slaves, came to us, and so wrought on the fears of the Johanna men by tales of the terrible Mazitu, or Zulus, that their eyes actually stood out with terror. They ran away under the sole influence of fear, and left me with only nine Nassick boys. The Johanna men had proved themselves such inveterate thieves by the way, that it was a relief to get rid of them.

"We had been in Mataka's district from the middle of July till the end of September, and in the beginning of October tried to go westward, so as to avoid the Mazitu altogether; but the people of Katosa, or Kiemasura, were afraid to take us up Kirk's range, because some Arab slave-traders had been driven thence by the exasperated inhabitants. Katosa tried to get carriers for us, but in vain, and, being an old friend, he at last turned out with his wives to do the work himself. Six stout ladies took up our loads, and soon shamed the young men with their sharp tongues. The range is only the edge of a high plateau, where the people, all Manganja, have not yet been led into buying and selling each other. We found them to be equally afraid of our people below, and, like all the interior people who have not been in contact with slavery, very kind. I gave a present of a cloth, and got ample provisions cooked for supper to the whole party, and breakfast the next morning. The people were supposed to be Maravi, but are in fact Manganja, under different names, as Kanthunda, Chipeta, Echewa, &c. Their land is high and cold. Their huts are plastered all over, even on the roofs, for the sake of heat by night. They are great agriculturists, and so many in number that one village is scarcely ever a mile from some other. We made short marches, and had a great deal of intercourse with these mountaineers; and possibly our account of the evils of the slave-trade may keep them from engaging in it headlong, as most Africans of this race are but too ready to do. The chief who had driven off the Arabs was delighted when I said I wished he would treat in the same manner all slaving parties of whatever colour, but complained that his countrymen would not join with him in expelling an invasion. This is true, for each village being independent of every other, they have no more cohesion than a rope of sand.

"As we went westward to avoid the Mazitu, we turned northwards as soon as we were past the longitude of their country, and nearly walked into the hands of a party out plundering. We met two villagers fleeing from them to some mountains, and went in the same direction in order to defend ourselves and them; but the Mazitu, after plundering the villages to which we were proceeding, turned off to the south-east. As we went northwards we saw more and more of their devastations, and suffered considerably from want of provisions. Crossing the Loangwa and the great valley in which it flows—the bed of an ancient lake—we entered Lobisa, a country of the Babisa, and for the first time got information as to the route the Portuguese followed in going to Cazembe. It is placed by the map-makers very much too far east. We never came upon it, so trod on new ground. It will enable one to form an idea of the way we went, if he conceives us going westwards from Katosa's, and then northwards till we take up the point at which we left off in 1863. The watershed between the Loangwa and Chambeze rises up to 6600 feet. The Chambeze was crossed in latitude 10° 34′ s. It had flooded all its banks with clear water, but the lines of trees showing its actual size were not more than 40 yards apart. I think that we are now on the watershed, though not the highest part of it, between Chambeze and Loapula. We have suffered a great deal from gnawing hunger. The Babisa, who were among the first natives to engage in slavery, have suffered its usual effects. Their country is depopulated, and the few inhabitants, now living at wide intervals from each other, had no provisions to sell. In the Loangwa valley, and also in that of the Chambeze, I had no difficulty in securing supplies of meat with the rifle; but Lobisa had no animals, and we had hard lines in marching through its dripping forests. We had no difficulties with the natives, other than those petty annoyances which are not wanting in even the smoothest life, and certainly not such as an explorer should moan over. This town has a treble line of stockades, and a deep ditch round the inner one. The chief seems a frank, jolly person, and, having cattle, we mean to rest a little with him. We are very much emaciated, but, like certain races of pigs, take on fat kindly. Our sorest loss has been all our medicines. We are 4500 feet above the sea, but, having rains every day, feel that we need, like the cattle of the people, the protection of huts. I regret that my geographical notes must be so scanty, but hope to send fuller information from Tanganyika. Our progress hitherto has been very slow. The boys cannot go more than 7 or 8 miles a day with their loads, and that is enough for me too with only a heavy rifle.

"I am, &c.,

"DAVID LIVINGSTONE."

3. *Letter to* DR. SEWARD, *Consul at Zanzibar.*

"MY DEAR SEWARD, "Bemba, 1st February, 1867.

"I send you my despatch to Lord Clarendon, and beg you to send a copy for Sir Bartle Frere's private information. I cannot possibly copy it, and have not taken a copy of the concluding sheet, nor of the geographical despatch.

"We found a party of Bagamoyo slavers here, all ready to start and hungry, so could not expect them to wait longer than a day. One of them was with Speke, so understands the nature of despatches, and I think they will be delivered. I send at the same time the documents you kindly lent, with many and sincere thanks.

"I sent a letter to go with the sepoys, but in charge of an Arab slaver named Suleiman, and fear that these fellows may have destroyed it. I shall first give you from memory the heads of the indictment.

"The sepoys seem to have planned my compulsory return as soon as they had killed all the beasts of burden; one camel they beat with the butts of their guns till he expired on the spot, and a mule was killed; certain sores were cruelly probed and lacerated when I was not in sight, and I came upon them one day when one was mauling a poor camel with a stick thicker than his arm; next day we had to leave it with inflammation of the hip-joint, the point where I saw the blows directed. They gave or paid 8 rupees into the hands of our Arab guide, to feed and take them down to the coast when the animals were all nearly done for, so sure were they of returning with their scheme triumphant. The havildar was seen paying the money by one of the Nassick boys. Then when we came to a part where provisions were scanty they refused to obey orders to come up to me, whither I had gone to secure provisions; and they would not rise in the mornings though called by the havildars, but I saw reason afterwards to believe that the havildars and Naik were art and part in the plot. A great deal of blubbering took place when I hauled them up, to send them back as prisoners. I sentenced the Naik to disratement, and all to carry small loads as punishment, but they were such a disgraceful-looking lot, and by disobedience had prevented my carrying out the only plan of getting provisions, namely by going forward and sending in all directions to purchase them, that they had to suffer hunger. They sold their cartridges, gave their muskets and belts to people to carry for them, telling them that I would pay for carriage, lay down perpetually in the march, and went to sleep. This was their custom all the way from the coast, and they were so filthy in their habits,—while we had plenty of food gorging themselves, then putting the finger down the throat to relieve their stomachs, and, lastly, they threatened to shoot the Nassick boys when away from English power in some quiet place, because, as they supposed, the boys were my informants.

"I sent them back from Mataka's, leaving sixty yards of cloth with that chief to give to the trader Suleiman, who was expected, and came a few days afterwards, to convey them to the coast. This cloth was amply sufficient for all their expenses. But I heard that the seven Mohammedans did not go with Suleiman, but remained at Mataka's, where food was abundant, and where their pay would be running on. They had their belts and ammunition-pouches, and muskets and bayonets, all complete then. The havildar pretended that he still wanted to go on with me; he thought I did not understand the part he had played: 'They won't obey me, and what am I to do?' was his way of speaking. 'Bring the first man to me who refuses a lawful order, and I shall make him obey.' None was ever brought. When he talked of going to die with me, I said nothing. He soon got sulky, and was a useless drag. I had to pay two yards of calico per day for carriage of his bed and cooking things, and could make no use of him. He could not divide provisions even without partiality, nor measure off cloth to the natives without cheating them. He complained at last of unaccountable pains in his feet, ate a whole fowl for supper, slept soundly till daylight, and then commenced furious groaning. He carried his bed one mile the night before without orders, then gave off his musket and belt to a native, to blind me as to his having stolen and sold the cartridges. The native carriers would not follow us through a portion of jungle, and when I sent back for the loads, the gallant havildar was found sitting by his own baggage and *looking on* while the carriers paid themselves by opening one of the loads. He then turned back to join his fellows at Mataka's; the country abounded in provisions, and the people were very liberal.

"The Johanna men fled from sheer terror of an enemy they never saw. I shall pay them what they deserve; but certain advances were made to them, besides 29*l.* 4*s.* by Captain Garforth, which I must deduct.

"We have lately had a great deal of hunger: not a want of fine dishes, but want of all dishes except mushrooms. The rains are very heavy, and for six weeks we have had hard lines. The Babisa country is depopulated by their own slaving. We are going to rest here a little, and may be at Tanganyika by May, but we travel slowly.

"I have had no information whatever from the coast. If you can send anything more to Ujiji, on Lake Tanganyika, please send 50 lbs. of coffee, a small box of candles, a stick of sealing-wax, a cheese in tin, a small box of soap, some French preserved meats, half-a-dozen bottles of Port wine well packed, and some quinine and calomel, and resin of jalap,—don't exceed these quantities, please, for heavy things we cannot carry. Please pay for them with what you have in hand. The sorest loss I ever sustained was that of my medicines, every grain of them, except a little extract of hyoscyamus. We had plenty of provisions after we left Lake Nyassa, but latterly got into some hunger.

"Don't think, please, that I make a moan over nothing but a little sharpness of appetite. I am a mere ruckle of bones, did all the hunting myself, and wet, hunger, and fatigue took away the flesh.

"Captain Frazer's rifle did good service—it is a splendid weapon; I feel extremely thankful for it.

"If Dr. Kirk is with you, will you give him all the information with kind regards. I cannot write to him at present.

"The head-man of the slaving party is named 'Maguru mafupi Nadim Sirkar a Lámji.' I told him to take the packet to the Sultan, as a letter for his Highness is on the outside, and you would pay whatever was right for the service on my account.

"Despatches are open, they may adhere from damp.

"DAVID LIVINGSTONE."

The following Despatch of Mr. Churchill, H.M. Consul at Zanzibar, to Lord Stanley, was next read:—

"MY LORD, "Zanzibar, 27th January, 1868.

"I have the honour to report the receipt of letters from Dr. Livingstone.

"Bundouky (Gnu), or Muguru Mafupee (Short Legs), as his real name appears to be, who was said some four months ago to be on his way to the coast, arrived on the 24th inst., and delivered the long expected and welcome letters into my hands.

"While others who had left Wemba with Bundouky had reached this months ago, he had been, within a few days, a whole year on his journey. His excuse, which is after all a good one, is that he was detained in the interior by business.

"Dr. Livingstone's letters, which I have the honour to transmit to your Lordship, as per accompanying list, will speak for themselves.

"He was first deterred from passing to the north of the Nyassa by the dread his followers had conceived of the merciless Zulu or Mazitu tribe inhabiting the north-west borders of the lake. In proceeding towards the southern extremity, the behaviour of the sepoys was such—killing, as they did, the beasts of burthen, with the hope of inducing the traveller to return—that they had to be dismissed. The havildar had to be sent away next, and on attaining the south end of the Nyassa Lake the Johanna men left in a body. Dr. Livingstone, little disheartened by the dismemberment of his party, proceeded on his journey with only nine lads, hardly capable of carrying his lighter loads; and after many difficulties and privations, of which he will, it is to be hoped, live to give an account, he arrived on the 1st February, 1867, at Bemba or Wemba. Dr. Livingstone expected to reach the Tanganyika by the month of May last, and will have been at Ujiji in June. At Ujiji he will have found provisions and medicines sent to him in July, 1866, by Dr. Seward. It is little likely that further provisions sent to him now, reaching Ujiji, as they probably would, a year after his expected arrival there, would ever be received, particularly as no direction of his course is given after that place. Bundouky and his two companions, one of whom had accompanied Captain Burton to the Tanganyika as one of the 'sons of Rumjee,' were questioned with reference to the geography of the country between Wemba and the coast, and from their description it would appear that no river of any magnitude had been crossed anywhere. Nor does Dr. Livingstone mention the existence of a river of any size other than the Chambesi, or Zambesi, and the Loapula, which do not join the Tanganyika or the Nyassa. Under such circumstances (a complete circle having been described round the Nyassa conjointly by Dr. Livingstone and Bundouky's party), the important question of the disconnection of the Nyassa and the Tanganyika, as Dr. Kirk well observes, appears to be satisfactorily solved.

"It may be interesting to your Lordship to read what Bundouky and his companions say relative to the country they have travelled over; and although information of this nature cannot be implicitly relied on, it is, nevertheless, not quite valueless. I beg leave to transmit to your Lordship a transcript of Bundouky's replies to my questions.

"The Johanna men deserve punishment for the want of truth they have exhibited in reporting Dr. Livingstone's death. I propose addressing his Highness Sultan Abdallah and Mr. Sunley on the subject, as soon as an opportunity offers.

"I have, &c.,

"H. G. W. CHURCHILL."

The following Postcript to a letter of later date, from Mr. Churchill, was also read:—

"P.S.—We have further news of Dr. Livingstone's arrival at Ujiji towards the middle of last October, as your Lordship will perceive from Issa ben Abdallah's statement.

"*February* 7*th*, 1868."

"*Statement of* ISSA BEN ABDALLAH KHARRUSEE, *an ivory merchant, who has just arrived from Ujiji.*

"I left Ujiji on October 6, and went to Salusee, where I remained ten days previous to setting out for the coast. While there I learnt that an European, an Englishman, had arrived at Ujiji. Mussa, a person established at Ujiji, was expecting him when I was at Ujiji.

"Transcribed by H. A. CHURCHILL.

"*Zanzibar, 5th February*, 1868."

The **PRESIDENT** then read extracts from a letter which had been addressed by Dr. Livingstone to Sir Bartle Frere, late Governor of Bombay, under whose auspices the expedition started:—

"Bemba, 1st February, 1867.

"I had no prospect of sending coastwise, but here I met a party of black Arab slave-traders from Bagamoio, near Zanzibar, and while they agree to take a packet they will not wait more than half a day for me to write; they have come here for the first time, about 10° 10′ S. lat., and 31° 50′ E. long.

"We have been a long time in making our way here, but some of the delay was pleasant, for I had intercourse with people who had not engaged in the slave-trade. We came round the south end of the lake. I was apprehensive if I took my Johanna men round the northern extremity they would bolt at the first sight of danger. They actually did run away on mere report of the doings of the terrible Mazitu or Zulus, and I was left with a following of nine Africans, six of whom are Nassick boys. The Johanna men had proved themselves such thieves it was a relief to get rid of them. The most influential chief on the watershed between coast and lake, called Mataka, wished very much that some of the boys would remain with him and show the use that could be made of his cattle in agriculture. Abraham met two uncles there, but no entreaty would induce him to remain, though Mataka was extremely liberal and seemed to please them all. 'How can I stop where I have no mother and no sister?' was the invariable reply. I promised to try and get some boys acquainted with Indian agriculture from the same school; but the system of teaching for India and not for Africa had better be altered. Abraham has done good service to me since, so I have no reason to be dissatisfied with him.

"I was obliged to go very cautiously, and seven or eight miles was all we could accomplish in a day. We went westwards from the west of the lake, ascended Kirk's range, which is only the edge of a plateau densely peopled with various tribes of Manganja who have not yet engaged in slaving. After going westwards till we were past the longitude of the Mazitu, we turned to the north, and taking up the point we left off at in 1863, we continued our northerly course, at times making a little westing. We crossed the wide valley in which the Loangwa flows—the bed of an ancient lake—then ascended the heights of Lobisa in the southern borders of lat. 11° S. Here we came to a depopulated country, an immense forest. The Babisa were eager slave-traders, and the ruin that has followed that traffic is now apparent in only a few hamlets occurring at wide intervals, and small patches of a species of millet at various parts in the jungle. The people had little or no grain to sell; they were living on mushrooms chiefly. While in the valley of the Loangwa we had plenty of game, and easily kept the pots boiling; but here not a beast was to be seen, and daily trudging through dripping sloppy forests, with the feet almost constantly wet, and gnawing hunger in the inner man, took the flesh off our bones. We crossed the Chambeze, as the Zambesi is here called, in lat. 10° 34′ S., only 40 yards wide; but it had plenty of animals on its banks, and we soon got a supply of meat. This, the chief town of this side of Bemba, has a treble stockade round it, the inner line having a deep ditch besides. If I am not mistaken, we are on the watershed between the Chambeze and the Luapula, which is said to flow into the Lake Tanganyika. It is said to be very large; but I hope to let you know better from the lake itself, where I hope to find letters and our second supply of goods. We are 4500 feet above the sea, the temperature cool, and the rains more abundant than I ever saw them in Africa. Very few days pass without a shower. The interior is chiefly forest, and excessively leafy: one can see but a little way off from an elevation. The gum-copal and another tree abound, with rhododendrons and various evergreen trees—the two first furnish the bark-cloth which is the principal clothing of the people. We have had no difficulties with the natives. Hunger and wet have been our greatest hindrances. We could not for some time find out where the Portuguese route to Cazembe lay, but it has been placed by the map-makers too far east. Hence they had no mountain chains such as we have met with. The watershed between the Loangwa and the Chambeze is 6600 feet above the sea.

"In case the sepoys destroyed my letter which I sent back with them, I may say that their scheme was to force me to return as soon as they had killed all the beasts of burden. The havildar actually paid on behalf of the rest eight rupees to our Arab guide to feed and lead them back to the coast. When found out, there was a good deal of blubbering, and they eagerly accepted a sentence to carry light loads. They obeyed none of the havildar's orders, he evidently conniving with them. They were an intolerable drag, and frustrated the best means I could devise for securing provisions, namely, by my going forward and sending in all directions for food. They would not march if I were not present, and even then, when I was out of sight they lay down and slept. On finding that one Bunach threatened to shoot a Nassick boy when he got him out of English power, I sent them back with ample cloth in the hands of a merchant to pay all expenses. The havildar came on, but could be made of no use in any way; and when we heard at the lake that the seven Mahommedans of the party had remained at Mataka's, where food was abundant, in order probably to let their pay accumulate while they played the mendicant, the havildar became sulky, shammed unaccountable pains in his feet, and returned to join the others.

"Mataka's town and country are the most likely for a permanent settlement to be made. It is elevated and cool. English peas were in full bearing and bloom in July; the altitude is over 3000 feet, and his country is mountainous and abounds in running streams, the sources of the Rovuma. Dr. Norman Macleod promised me to try and get some German missionaries from Harmsburg in Hanover, and salaries for them, if I could indicate a locality. These same men go without salaries, and are artificers of different kinds; but this is a mistake, they ought to have a little, for some of them have in sheer want taken to selling brandy even, but at Mataka's they could easily raise wheat by sowing it at the proper time, and native produce when the rains come, but it would require a leader of some energy, and not a fellow who would wring his hands if he had no sugar to his tea. I have almost forgotten the taste of sugar, and tea is made by roasting a little Joare, and calling the decoction either tea or coffee. I have written to the Doctor, and given some account of the difficulties to be overcome; 300 miles is a long way to go, but I feel more and more convinced that Africa must be Christianized from within.

"Believe me, affectionately yours,

"DAVID LIVINGSTONE.

"P.S.—His Highness the Sultan did all he could for us, and was extremely kind; but his people, to whom I bore an epistle, all skedaddled as soon as they heard that the 'English were coming.' The dhows (two) on the lake were kept out of my way, lest I should burn them as slavers! and I could not get across the middle of the lake."

The PRESIDENT said that the question in which geographers and the British public at large were now interested, was the future course of Livingstone, and at what time he might be expected to return. In the journey from the place at which he disembarked, Mikindany Bay, to the south end of the Lake Nyassa, he occupied seven months; but for three weeks or more of that time he remained at Mataka's. The distance traversed from the coast was only 500 miles. During those seven months people often asked in England, "Why does not Livingstone send us some account of his proceedings? The sepoys have returned, but they have brought no despatches." He (the President) was sorry to say that the sepoys behaved extremely ill. We now had in Livingstone's own handwriting the statement that they were the worst of companions, inferior even to the Johanna men. He entrusted to the sepoys a despatch, which they never delivered. The next part of Livingstone's journey, after crossing the Shiré, was to the west and northwards, taking a circuitous course, in order to avoid the Mazitu. It occupied five months, the date of the despatches being the 1st of February, when he was at Bemba. The progress made to this point would enable us to judge of the time he was likely to take in accomplishing the remainder of his journey. We now know that he had arrived at Ujiji, on the eastern shores of Lake Tanganyika by about the middle of October last. The distance between Bemba and Ujiji was only 500 miles; but he (the President) was delighted to hear that the traveller had been so long on this part of his route, because it implied that he had devoted himself to examining Tanganyika, which had never yet been explored. It was not known whether the rivers at the southern end ran into it or out of it. When Burton and Speke crossed the lake in the northern part at Ujiji, they knew nothing of the southern part except from information furnished by Arabs. If Livingstone found the waters flowing northward from the neighbourhood of Bemba, whence he wrote, and into the Lake Tanganyika, he would continue his journey to the northern end. There would then lie before him another great problem, the solution of which would be the settlement of the geography of the whole interior of Africa. If, according to the theory of Mr. Findlay, which had been read before the Society, the waters of Lake Tanganyika flowed into the lake Albert Nyanza, the geographical object of Livingstone's expedition would be accomplished. He would be upon the waters of the Nile, and having determined that great physical problem, he would probably turn to the eastward and reach the coast at Zanzibar. If, on the contrary, it proved, as shown on the original map of Burton and Speke, that a mountain range separated Tanganyika from Albert Nyanza, the outflow of the waters of Tanganyika must be sought for on its western side; for being fresh, those waters must have a free outlet in some direction. In this case, Livingstone might be induced to follow that river wherever he found it. It was known that there was no outflow to the east, because the country on that side had been explored, and no great stream found. To follow such a western outlet would lead him far across the great unknown western interior of Africa. Such was Livingstone's great vigour and audacity in meeting every difficulty that he (Sir Roderick) had not the slightest doubt that he would pursue such a river, if found, and come out on the west coast, where his first expedition terminated, before he recrossed to the Zambesi. In this case we must not expect to hear of him for twelve or even eighteen months. But if, under the hypothesis which he (the President) rather held to, Livingstone found the waters of the Tanganyika flowing into Baker's lake, and turned back towards Zanzibar, as most probably he would do, he might be expected in England in the month of September next. A third hypothesis was, that having since arrived at the lake of Sir Samuel Baker, he would follow its waters and come out at the source of the Nile. He (the President) had dismissed that hypothesis from his own mind, in consequence of the small force which Livingstone had at his disposal, and the diminished store of goods for presents to give to the equatorial kings. Knowing the difficulties which Speke and Grant and Baker had in those countries, he would pause before concluding that he had taken that route, particularly after he had geographically solved the problem. Another reason which operated in his (the President's) mind against the third hypothesis was, that Livingstone would have to go through the whole of the White Nile region, where the slave trade was carried on to an abominable extent.

Sir SAMUEL BAKER said that he had been perfectly charmed, not only with the ability, of which they were all cognisant, which the President had displayed in his remarks, but also with a particular phrase of which he made use, which was that the public were interested now with the "future of Livingstone." Never in his life did he (Sir Samuel) confess that he was wrong with such intense pleasure as he did to-night. The difference between himself and Sir Roderick Murchison was that the latter was the great theoretical African traveller, while he (Sir Samuel) was a practical one. The President had adhered to his friend Dr. Livingstone, as he always did to all his friends, and particularly his geographical ones; and he would not allow that Livingstone was dead, although the evidence of the fact was such as would have been accepted as legal by any jury of twelve. It was now found that Sir Roderick was right, and that Livingstone was still alive. The difference between the President and himself (Sir Samuel) was, that while the former was now delighted at being right, he (the Speaker) was delighted at being wrong: for if he had been right, not only he but the whole world would have lost a friend; but as Sir Roderick was right the whole world had regained a friend. Livingstone was a man who would have the opportunity of doing what few men could do, namely, of reading his own epitaph, and knowing the world's opinion of him after his supposed death. When Livingstone last wrote he was in latitude 10° s. When he was last heard of he was supposed to be near Ujiji, in October. At that time the people must have been departing with their ivory to Zanzibar. These people had to depend upon seasons, and hence they would have missed the letters which Livingstone would have sent had he arrived in time. He must be without the means of communication until the next season should arrive for the departure of the caravans. The President agreed with him in believing that Livingstone would not take the northern journey. He (Sir Samuel) could not conceive that any man of Livingstone's experience would undertake the great voyage to the north, having arrived, after an African journey of nearly two years, at Ujiji, with his medicine chest lost and his funds exhausted, unless he there received very large supplies both of funds and physic. To extend his journey northward without medicine, without large supplies to satisfy the exorbitant demands of the African kings, and without that vigour which travellers carried with them when fresh from England, would be a most frightful task; and he (Sir Samuel Baker) hoped that instead of undertaking it, Livingstone would return to England, which, in that case, he would do within a very short space of time. The question arose, where could the meeting be held to receive him when he should return? It would be impossible to accommodate him in the usual meeting-hall, and it had been suggested that the Society should apply to Mr. Spurgeon for the Tabernacle, or to Mr. Beales for the use of Hyde Park, on such an occasion. But wherever they received him it would be with open arms. It was the duty of the Society to tender their thanks to their father, the President, who watched over the members in their travels with a paternal regard. When the world believed that Livingstone was dead, and had awarded him their tribute of praise, there was still one man, and almost only one, who stood by and said, "He is not dead," simply because his kind heart would not allow him to die.

The Rev. H. WALLER said that he had received from Dr. Livingstone a very long letter dated the 2nd of February, in which he spoke of Lake Nyassa and of the dreadful slave-trade going on there, and which was now raging worse than ever. He spoke of countries depopulated, and of the old horrors with which those who had been with him were familiar. Although Dr. Livingstone was, perhaps, the principal geographer of the present day, he was not travelling without an object still higher than geography. His future task would be to turn to account the knowledge which he was now gathering. He was travelling through a country which was utterly spoiled and torn to pieces by the slave-trade. He was penetrating into the back provinces of that trade, and he looked to the English nation to take some notice of it. The Sultan of Zanzibar was willing to throw himself into the hands of the British Government as an instrument in stopping the slave-trade. The traffic was an abomination, and ought to be stopped. He (Mr. Waller) regretted that his friend Mr. Young was not present to share the joy of the Society in hearing of Dr. Livingstone's safety. All Mr. Young's suggestions were borne out to the letter by the communications that had been received. He (Mr. Waller) would not venture to speak of Dr. Livingstone's future movements in the presence of Sir Roderick Murchison, to whom he should henceforth bow as the prophet of Africa. If Sir Roderick said that Livingstone would come out on the west coast he (Mr. Waller) would at once crush his idea that he was coming out at Alexandria. He could endorse Sir Samuel Baker's expression of appreciation of that kindness of heart on the part of the President which had followed African explorers. He had been present in Africa when despatches had been opened from Sir Roderick, and he could testify to the delight felt by travellers for the kindness with which he had ever watched over them.

The PRESIDENT, in reference to the observations of Mr. Waller, remarked that Livingstone had on this journey passed through countries not troubled by the slave-trade; he had seen extensive tracts inhabited by very happy people, where the slave-trade was unknown. Mr. Young, to whom the last speaker had alluded, had received the unanimous thanks of the Society, and he (the President) had dwelt particularly, at the commencement of the evening, on the most admirable expedition of Mr. Young. Without his good conduct of that expedition they would never have been able at that time to expose the lie respecting the death of Livingstone.

Captain SHERARD OSBORN was prepared, as in former days, to believe in Livingstone's success. With regard to his future course, he accepted the first hypothesis enunciated by the President so far as related to the belief that Lake Tanganyika flowed to the north; but he was obliged to differ from him in supposing that Livingstone would turn back to Zanzibar after assuring himself of that fact. Reviewing the difficulties he had encountered for the two years previously, and finding water-communication between him and the Nile, he thought he would be more likely to take to boat and sail on to Gondokoro, than to return by land to Zanzibar. He (Captain Osborn) could not conceive that Livingstone would turn to the westward, where there was a huge blank of which he was not cognizant. If, as Mr. Findlay believed, there were an opening to the northward, he would probably pass that way in spite of the difficulties of the route, with which he was not unacquainted. He advocated the notion of sending an expedition up the Nile to meet the traveller.

The following Paper was then read by the Author.

A Journey from Norton Sound, Behring Sea, to Fort Youkon, at the Junction of the Porcupine and Youkon Rivers. By Frederick WHYMPER, Esq.

THE author stated that the journey was made in the service of the Russo-American Telegraph Expedition, since abandoned. During the winters of 1865-6 and 1866-7, there were stations at the Anadyr River and at Plover Bay in Eastern Siberia; at Port Clarence and Norton Sound, and on the great Youkon River, in Russian

America. The men were engaged both exploring and erecting the telegraph, in a temperature frequently below the freezing point of mercury; minus 58° Fahr. was their lowest recorded temperature in Russian America. The axe-men, in cutting poles, found their tools continually losing their edge, or cracking into pieces. Health was, nevertheless, preserved and the work carried forward throughout the winter. Both "Youkon" and Kwich-pak (pronounced Kwif-păk), the two names of the river, are Indian words, signifying "big river." After giving a sketch of the various explorations of the river, the author proceeded to narrate that he was attached to the Youkon division of the telegraph party in September, 1866. On the 2nd of October he went to Unalacheet, in a small steamer from Norton Sound; the Unalacheet River was then frozen up, and ice was forming on the coast. On the 7th of October the steamer was beached for the winter, and he travelled by land and by the frozen Youkon to Nulato, where he arrived on the 15th of November. Nulato is the most interior and northern fort of the Russian-American Fur Company. Indians resort hither from a distance of 300 miles to barter their furs; as many as 5000 marten-skins have been brought by them in one year, besides other furs. During the winter he observed the Indian mode of fishing through the ice on the Youkon. Early in the season large stakes were driven down through the ice to the bottom of the river. To these were affixed traps, consisting simply of a wicker funnel leading into a long basket. Oblong holes in the ice above them were kept open through frequent breaking, and sometimes a great haul of fish was the result, when the traps were raised. On the 10th of April the willows began to bud; on the 28th the first goose arrived from the south, and on the 13th of May swallows were flitting around the fort. The break-up of the great river was an interesting sight: it made its first move on the 19th of May; a constant stream of broken ice swept down, surging into vast piles, grinding and crashing on its way; the banks were torn and swept away, and the water rose 14 feet above its winter-level. On the 26th of May Mr. Whymper and Mr. Dall commenced their journey up the great stream: 600 miles above its mouth it was a mile and a quarter wide, with a current, at this season, of 6 knots an hour. They passed the mouths of many large tributaries and several deep bays, and reached Nuclukayette, the furthest point ever reached by the Russian fur-traders, on the 8th of June. Beyond this they entered an unexplored part of the river. The days now became too hot for travelling—sometimes 78° in the shade, and they progressed only during the twilight hours of night. The only rapids met with for 1200 miles were a day's journey above Nuclukayette, but they passed through with very little trouble. Fort Youkon (belonging to the Hudson's Bay Company) was reached on the 23rd of June. On the 8th of July the party—increased to four, besides Indians—commenced the return voyage; the birch-bark canoes were lashed together, and suffered to float down with the current, travelling at the rate of 100 miles in 24 hours. At Nulato they stopped two days, and resumed their voyage in a larger boat obtained from the Russians. The Indians in the lower part of the river were found busily occupied in taking salmon and drying it for winter use. Towards the delta the current was more sluggish, averaging about 3 knots an hour. Long stretches of low country extend in all directions, with islands, sand-banks, and channels innumerable. The author believed that a flat-bottomed steamer of good power, capable of going 10 knots an hour, might navigate the Youkon for a distance of 1800 miles. Soundings were taken at the various mouths of the river by officers belonging to the expedition, and the Aphoon mouth, or most northerly, fixed upon as the only available one for vessels. A warm acknowledgment of the kindness and ability of the American gentlemen comprising the expedition brought the Paper to a conclusion.

The paper will be printed entire in the 'Journal,' vol. xxxviii.

The PRESIDENT reminded the meeting that the region traversed by the great Youkon River was now handed over to the Americans. The author of the Paper had not led the Society to suppose that the new possessors would obtain a great deal of profit from the acquisition, except it were by the skins and furs which the country furnished in abundance. He confessed that, until informed by the Paper, he was unaware of the course and magnitude of the Youkon, and he only wished that it flowed through a more fertile country.

Captain BEDFORD PIM said he rose to pay his tribute of admiration to Mr. Whymper for his adventurous journey. The Paper which he had written was of very considerable importance, as being the only account we have yet had of this extensive region. The Youkon was especially interesting to Englishmen as being the locality in which the first traces of the Franklin expedition were heard of. He had himself made a journey from Kotzebue Sound to Michaelovskoi Redoubt in search of traces of Franklin; and Lieutenant Barnard was killed while following up traces which he (Captain Pim) had been the first to hear of. It would be seen from the Paper how easy it was for the Indians to bring the guns and other relics of the expedition down to Derabin by means of the river. He was not quite sure he was in order, but if so he would move the adjournment of the discussion on the Paper, as the hour was too late now to do justice to this very important subject.

Eleventh Meeting, May 11*th*, 1868.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Matthew Blakiston, Esq.; F. Barlow, Esq.; William Busk, Esq.; F. C. Cory, Esq.,* M.D.; *Andrew Ellison, Esq.,* C.E.; *John T. Fletcher, Esq.; Henry Freeman, Esq.; J. L. Hart, Esq.; Rev. Walter Hiley,* M.A.; *Major T. J. Holland; Samuel Hoare, Esq.,* M.A.; *Stephen J. Hobson, Esq.; William S. Jones, Esq.; Lieutenant-Colonel H. Le Couteur; Robert Montgomerie Miller, Esq.; Robert Michell, Esq.; Charles M. MacGregor* (Lieutenant Bengal Staff Corps); *J. H. Paull, Esq.,* M.D.; *Alfred Richards, Esq.; Charles W. Roberts, Esq.; Percy J. Rowlands, Esq.; Rev. C. F. Stovin; Graham Manners-Sutton, Esq.; Colonel Robert Wardlaw.*

ACCESSIONS TO LIBRARY TO MAY 11TH, 1868.—'La Turquie sous le Règne d'Abdul-Aziz, 1862-1867.' Par F. Millingen. Street's 'Indian and Colonial Mercantile Directory for 1867-68.' Donor, the author. 'Tenerife geologisch-topographisch dargestellt von Fritsch, Hartung und W. Reiss.' Purchased. 'South Australia.' By Anthony Forster. 1866. Donor, the author. 'Brazil.' By Professor and Mrs. L. Agassiz. 1868. Purchased. 'Interior of South Africa.' By James Chapman. Purchased. 'Twenty-four Views of the Vegetation of the Coasts and Islands of the Pacific.' By F. H. Kittlitz. Purchased. 'Voyage dans l'Afrique Australe, par A. Delegorgue, 1847.' Purchased. Horneman's 'Voyage dans l'Afrique Septentrionale, 1803.' Donor, W. D. Cooley, Esq. Vayssière's 'Voyage en Abyssinie, 1857.' Donor, W. D. Cooley, Esq. 'Political Missions to Bootan.' Calcutta, 1865. Purchased. Reland's 'Palestine.' 1714. Rohlfs' 'Afrikanische Reisen.' Paijkull's 'Iceland.' Marsh's 'Man in Nature.' Orme's 'Hindostan.' Cunningham's 'Buddhist Monasteries in India.' Darwin's 'Volcanoes.' Darwin's 'Geological Survey of South America.' Engraved portraits of early voyagers and travellers:—Capt. Cook, Dampier, Drake, Banks, Ross, La Pérouse. Purchased.

ACCESSIONS TO MAP-ROOM SINCE THE LAST MEETING OF APRIL 27TH.—Abyssinia, part of: from Tekonda to Addigerat, with a view of Magdala. Ditto: from Addigerat to Magdala. Presented by Dr. A. Petermann. A. Stieler's Hand Atlas. Twelve parts of ditto, viz.: Nos. 2, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, and 25. A. Stieler's Karte von Deutschland, four parts, viz.: Nos. 3, 4, 5, 6, 7, and 8. Presented by the author. Peru: Section of Route from Iquique on the Pacific across the Cordilleras and Great Salinas to Potosi. Presented by W. Bollaert, Esq., F.R.G.S. Peru: a tracing of a Route from Húanuco to Puerto Prado, with Sections of Elevations, &c., by Messrs. A. Wetherman and J. K. Tucker, 1867. Presented by Don M. F. Paz-Soldan, Honorary Corresponding Member. Map of British Honduras, by J. H. Faber, Esq., Crown Surveyor. Presented by Sir Frederic Rogers, Bart., Under Secretary of State, Colonial Office. A Map of part of Armenia, showing Lake Van, by Major Frederick Millingen; two copies. A Litho-photographic Impression of the Diagram, 'Island of Santorin,' executed by a new system of lithographic printing, with several specimens of other subjects. Presented by Mr. R. Warner, of the Litho-photographic Institute. Map of part of Central Abyssinia, based upon the Surveys and Explorations of various authors, brought up to the present time. Presented by the War Office, through Sir Edward Lugard.

The following papers were read:—

1. *On the Peninsula of Sinai.* By the Rev. F. W. HOLLAND, M.A., F.R.G.S.

THE author stated that the experience he had gained during a former visit to Sinai, in 1861, had enabled him to adopt a more independent mode of travelling than is usually followed in that country; and, dispensing with the services of a dragoman, he had now traversed on foot, in two journeys, a very large portion of the peninsula. He commenced his last journey at Suez on the 10th of October last, taking with him four camels laden with provisions for four months, a small tent, and other necessaries. His plan was to make the monastery at the foot of Mount Sinai his first point, to establish there his depôt, and make it his head-quarters while he was examining the surrounding country.

Crossing the head of the Gulf of Suez he kept along the coast until, on the third day, he reached the mouth of Wady Ghurundel. Here he stopped to pay a visit to the hot springs of Jebel Hummam Faroun, a mountain which cuts off further progress along the coast. The lower portion of the wady is one of the most fertile in the peninsula, containing a perennial stream, along which are found wild ducks and many kinds of smaller birds. After keeping up Wady Ghurundel for a few miles, he again struck southwards across a limestone plateau behind the Hummam Range, and descended again to the sea by Wady Taiyibeh, continuing thence along the Plain of El Morkha until he reached the mouth of Wady Feiran. Taking the main road to Jebel Musa, which lies up this wady and

Wady Es-Sheikh, Mr. Holland reached the convent on the 19th of October, and, dismissing his Arabs, took up his quarters with the twenty-six Greek monks who live there.

During his stay he occupied a little room at the top of the convent. He was awoke every morning at sunrise, by the clanging of the pieces of iron and wooden boards, used as bells to call the monks to service. Going to the pilgrims' kitchen, where the monks always had wood and water placed for him, he lighted a fire and prepared his breakfast, after which he started on his day's journey of exploration. He found that the monks and their attendants knew little or nothing of the country, and refused all their offers to serve him as guides, depending rather for information of mountain-paths on the Arab ibex-hunters. Leaving the convent he used to let himself down from a little gate in the garden-wall by a rope, and proceeded on his rambles. By the 7th of November he had explored most of the surrounding country within a day's walk of the convent, and began to make more lengthy excursions to distant parts of the peninsula, taking with him an Arab to carry his blanket and bag of provisions, and sleeping out three or four nights in succession. Water he found not nearly so scarce in the granitic district as had been supposed, and there was a far larger amount of vegetation than had usually been described. In his longer excursions he explored Jebel Um Shaumer (which he ascertained to be considerably lower than Jebel Katherine), Jebel Hadeed, Jebel Eth Thebt and the important wadies stretching from it, Senned, Jebel Serbal, Ras Mohammed, the mines of Serabit-el-Kadim, Ain Huthera, Jebel Odjmeh, and many other places of interest in the neighbourhood. On the 3rd of December he witnessed a fearful thunderstorm and flood, whilst encamped in Wady Feiran, near Jebel Serbal. After a little more than an hour's deluging rain, the dry wady was transformed into a foaming torrent, 300 yards broad and from 8 to 10 feet deep, sweeping away many Arabs with their tents and flocks, and hundreds of beautiful palm-trees. With regard to the route followed by the Israelites, the author came to different conclusions, on many points, from those usually received. In the first place, as regards Ain Huthera, identified as Hazeroth, the third station of the Israelites after leaving Mount Sinai, he found its position quite precluded all idea of its being one of the stations, for it lies in a complete *cul-de-sac*. The site of the battle of Rephidim, he showed reasons for fixing in the Wady Es Sheikh, at a spot about 10 miles from Jebel Musa. The Arabs here point out the "Mokad Nebi Mûsa," *i. e.* "the Seat of the Prophet Moses," at the foot of which the wady cuts through the long ridge of granite which stretches north-eastward across the centre of the peninsula. Here the Amalekites probably awaited the arrival of the Israelites, and the rock above was the hill on which Moses took his stand. The course of the Israelites, after crossing the Red Sea, he believed to be along the lower road by the coast to Ain Szouweira (*Marah*), thence inland to Ain Howara (*Elim*); afterwards again by the sea near the mouth of Wady Ghurundel. The *Wilderness of Sin* he would identify with the plain of Es Seyh; *Dophkah* he would place near the head of Wady Berah; *Alush* at Wady El Osh, and the route thence to the Rephidim and Mount Sinai up Wady Es Sheikh. One mountain only appeared to the author able to enter into competition with Jebel Mûsa, as Mount Sinai: this was Jebel Um Alowee, "the Mother of Heights." The plain Senned, which lies beneath this mountain and contains an area of nearly thirty square miles, is capable of holding a much larger host than that at the foot of Jebel Mûsa.

In conclusion, the author protested against the theory that the Sinaitic inscriptions were the work of the Children of Israel. He had carefully examined hundreds of them, and had not found one single point in favour of such a theory. The strongest evidence against it is the existence of a bilingual inscription, Greek and Sinaitic. But who the authors of the inscriptions were, remains a matter of doubt. Mr. Holland discovered, however, that they were almost all engraved with stones.

The paper will be printed entire, with map, in the 'Journal,' vol. xxxviii.

The PRESIDENT returned the thanks of the meeting to Mr. Holland, and said that he had heard no paper on subjects of biblical history which had gone so far as the present one to realise the accounts given in Scripture. The paper was not only extremely interesting as a narrative, but had thrown much new light on geographical questions in which we were much interested. He was delighted that there was connected with the Society a gentleman who was such an ornament to the Church, and so good a geographer.

Captain FELIX JONES said that it was upwards of thirty-eight years since he traversed the Peninsula of Sinai; and his journey was undertaken with a view more to the general geographical survey of the Red Sea and the Gulf of Akabah than to the detailed exploration of the peninsula. He traversed that country at a time when Europeans were exposed to great danger in travelling there. He was a companion of the celebrated traveller Welbey, and went over with him the whole of the peninsula. Their sole object was to ascertain the altitude of the principal mountains and certain positions. Those points were fixed trigonometrically and astronomically; but during the last thirty years the original drawings of those surveys had been lost, as had surveys of a more recent date, merely through want of care in the official departments. Of the labours of himself and companion in connexion with Sinai, nothing remained but the reduced charts of the surveys of the Red Sea. It would be highly interesting to have such a survey as that of which Mr. Holland spoke, undertaken with a view to settle the topography of this very interesting country. He could bear witness to the exactitude of most of what Mr. Holland had stated with respect to the principal geographical features and the mines. Those mines must have been worked at a very remote period; the word which had descended as the name of the place where they were situated meant "a cave," and was no doubt given on account of the operations which were conducted there. Great credit was due to Mr. Holland for the very great pains with which he had investigated the country generally, and for the admirable map he had placed before the meeting.

Mr. CYRIL GRAHAM said he must pay his tribute of admiration to Mr. Holland's enterprise. The results at which he had arrived were due to the indefatigable zeal and industry which had led him to pursue his researches on foot. Mr. Graham would wish to call attention to the Amalekite ruins which had been described as round, and dome-shaped, and to the legend which attributed their erection to the necessity of a refuge against mosquitoes. Connected with this, Mr. Holland had also alluded, with certain discredit, to a tradition which covered the peninsula with trees in ancient days. Now he (Mr. Graham), as a rule, laid the greatest stress upon unwritten tradition, especially in an instance like the present, when it bears no traces of a foreign touch. Trees and mosquitoes naturally go together, and the story of the ruins, too simple to be designed, probably records an important fact in the natural aspect of that country. In all parts of the globe where forests perish, rain ceases or diminishes in quantity, and desiccation, of course, follows. Such a change has occurred, not only in Sinai, but Central Arabia and Asia, and many other regions. As for the *Sinaitic* writings, he (Mr. Graham) considered them now to be tolerably well understood. They belong to one of the many Sinaitic dialects which are to be found perpetuated in cursive characters between the Tigris and the Red Sea. The bilingual inscription is interesting, and should help in the further task of deciphering. The copper mines, as Egyptologists know, were already worked by the sovereigns of the 4th dynasty, long before the time of Abraham. The curious group of stones, called El-'Ojmah, to which Mr. Holland had pointed on the map as a series of rocks hanging in festoons, derived its name from the Semitic word *'ajamah*, which, in one sense, implied confusion.

Captain FELIX JONES asked whether it did not also mean "a heap."

Mr. CYRIL GRAHAM replied that it did, but that "confusion" was the primary meaning involved. A babbler, or one who talked a foreign tongue, for instance, was called 'ajami, a term synonymous with *Berber*, *barbaros*, and the Teutonic *Welsh*. In the above sense—of confusion—he was inclined to think it was applied to the rocks by the Amalekites, or Nabatheans, the latter of whom were, without doubt, the earliest inhabitants of the district of whom we have any knowledge.

Mr. KENNELLY said he would mention a fact connected with the physical geography of the Gulf of Suez, which he had been led to investigate some years ago, when stationed in the Red Sea, and which he believed would tend to support the theory of the author of the Paper that the Israelites had crossed at some place near the head of the Gulf, and that, having crossed, they had for the first days of their journey kept close to the sea shore. It would be noticed that at the base of the high land of Jebel Ataka, there runs for a considerable distance into the Gulf a low cape of the same name. Now from this cape, in a direction of E.N.E. to the opposite shore, between Gad ul Murkub and the wells of Moses, there exists a shallow bank, composed of irregular patches, with a depth of water varying from four to six fathoms. Its length from shore to shore is four miles, and its breadth a little over three-fourths of a mile, while on each side there are corresponding depths of eight and ten fathoms. He was led, therefore, to believe that the miraculous passage across the sea was effected upon this bank, which by the action of the strong east wind, that was made to blow all the night, in sweeping the waters into the northern end of the Gulf, would be laid bare, and give to the Israelite host a broad and comparatively easy passage to the opposite shore, while on either hand there would remain a depth of water sufficient to constitute a "wall," in the sense in which the same Hebrew word is employed elsewhere in the old Scriptures. It was a known fact that in the present day a similar phenomenon, on a more limited scale, occurs in the Red Sea. After a gale of some continuance up or down the sea, the "Dædalus" reef is seen to be comparatively dry or submerged, according as the gale may be from the north or south.

Sir **SAMUEL BAKER** said that he could not help thinking, after the reading of the paper, how much better it would be for young men with strong legs and good heads to pass their holiday time in the manner adopted by Mr. Holland, than to occupy it in going to those miserable Alps, and climbing up simply to tumble down again. He believed—and he thought that Sir Roderick Murchison would be inclined to second him in the opinion—that in the Exodus from Egypt Moses, under Providence, owed much of his success to his geographical knowledge. After reading Mr. Holland's paper, he had referred to Josephus, in whose works he found a passage which exactly bore out the belief which the inhabitants of Sinai held at the present day, that there was some mysterious connection with God in the mountain of Sinai. Mr. Holland had mentioned reports like the firing of guns, which of course were naturally caused by the falling of rocks. In the time of which Josephus wrote, the people had the same idea that there was something supernatural connected with that precipitous mountain. Josephus's account was as follows:—

"Now this (Mount Sinai) is the highest of all the mountains thereabouts, and the best for pasturage, the herbage there being good; and it had not been before fed upon, because of the opinion men had that God dwelt there, the shepherds not daring to ascend up to it."

This referred to the time when Moses took Jethro's flocks to the pastures at the base of Sinai. The same superstition pervaded that locality to the present moment. This bore out the remarks which Mr. Graham had made as to the permanence of tradition. He (Sir Samuel Baker) was himself a firm believer in the integrity of Eastern traditions. When Moses became Jethro's son-in-law, and had charge of Jethro's flocks, he wisely led them to Mount Sinai, where the pasturage was good, in consequence of other superstitious shepherds being afraid to go there. Moses, however, lived in this district forty years, during which time he acquired the geographical knowledge of the country which was afterwards most valuable in the exodus of the Israelites from Egypt; he must most probably have known the ford which had been mentioned as the point at which the Red Sea was crossed.

The Rev. Mr. **HOLLAND**, in reply, said he quite agreed with Mr. Cyril Graham, that in former times there was probably a very large number of trees compared with the present state of the peninsula; but at the same time he would observe that the destruction of the trees would not necessarily alter the general features of the country. He believed that, in its general features, the country was exactly the same as it was at the time of the Israelites. His chief reason for that opinion was that in the sandstone district there were Egyptian tablets of the date of the exodus, which were now in an almost perfect state of preservation. Sandstone was a much softer rock than granite, and he believed that those tablets could not have remained to the present time had the physical features of the country greatly altered. He could not claim the bilingual inscription as a discovery of his own. It had been known for some time, and Mr. Grey copied it. It had also been already published. Mr. Foster knew it, and spoke of it as an "evident superfetation of barbaric Greek."

He passed it over with those long words; but no one could have any doubt that the "barbaric Greek" was done by the same hand as the other inscriptions. The workmanship in both cases exactly corresponded. With regard to the ruins, Mr. Cyril Graham had said that the Nabaioths or the Nabatheans inhabited the country between the time of the Amalekites and the monastic occupation of the country. He (Mr. Holland) firmly believed that the Sinaitic inscriptions were the work of the *Nabatheans*, and that they established a mining or trading colony in the peninsula, making Serbal their centre. The ruins on the top of Serbal were probably those of their temple. As to the crossing of the Israelites over the Red Sea, one gentleman had spoken about "the author's theory;" but he (Mr. Holland) must declare that he had no theory whatever on the subject. He had read an immense number of theories, but he had never been able to get over the plain expression of a "wall of water on each side." He did not believe that any theory which had been raised would explain the formation of that wall of water. He would mention another interesting tradition, which he had heard in the peninsula,—the Arabs believed that the rainfall was regulated by the monks opening the book of Moses; and after the flood to which he had alluded in his paper, the Arabs remarked that the monks had opened the book too wide. They also informed him that they believed that the Pacha of Egypt regulated the rise of the Nile by opening and shutting the Book of Miriam. Probably the connexion of the name of Miriam with this tradition, as to the overflow of the Nile, arose from the fact of Miriam watching over her brother Moses when he was laid in the flags by the river's bank.

Mr. KENNELLY explained that when he spoke of "the author's theory," he merely alluded to his theory of the route of the Israelites after crossing the Red Sea, and not to any theory as to the place or manner of the crossing.

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2. *A Visit to the North-East Coast of Labrador, during the Autumn of* 1867, *in H.M.S. 'Gannet.'* By Commander W. CHIMMO, R.N.

THE object of this voyage was to search for new fishing-grounds on the little-known Labrador coast, and to find harbours of refuge for the Newfoundland fishermen. The *Gannet* sailed from Halifax on July 31, 1867, and passed up the east coast of Nova Scotia to the beautiful harbour of Sydney. Hence, continuing northwards, she began to meet with icebergs on the 4th August, near Wreck Bay, in Newfoundland; the first seen was 80 feet high, perfectly white, except here and there streaks of ultramarine blue. Battle Harbour, on the coast of Labrador, was reached on the 5th. About 300 persons were found here engaged in the fishery; but the ice had been unusually thick this season, and only half-cargoes could be obtained. Passing Petty Harbour, Alexis and Gilbert rivers, the coast was picturesque but bare, and, when the north-wind died away, a mirage arose which distorted the land into most surprising shapes. Occasional Harbour was next visited, and some interesting information obtained about the capelin, a delicious fish peculiar to these latitudes. During succeeding days numerous fishing-vessels and busy people were seen in every cove and harbour; in some harbours there were as many as 1000 boats. When off Round Island, the position of the most easterly point of Labrador was fixed by observation, and the longitude as given on charts, found to be in error, by 10″ 30‴ too far east. In short, the result of the survey by the *Gannet* was to prove that the whole of the coast had been erroneously placed by previous imperfect surveys 10 or 11 miles too far to the eastward. In "Indian Tickle" Harbour, 126 cod-fish were taken by the officers of the ship in less than half an hour by hook and line, sometimes two fish by one line. The distance from "Cutthroat" to Webeck was found to be 44 miles; by the chart it was 27. Webeck was reached on the 8th of August, and surveyed during the following days. From the top of the island Commander Chimmo counted 52 large icebergs aground in the offing. After completing the survey of Webeck and Indian harbours, the ship, on the 20th August, proceeded northwards, having embarked an Esquimaux pilot named John Tooktooshner. Aillik, a Hudson Bay settlement, was next visited, and afterwards Hopedale, where there is a numerous settlement of Christianised Esquimaux. On the 23rd of August the survey of the harbour was commenced and finished on the 26th, in the midst of a north-westerly gale. Hopedale was the limit of the voyage northwards, and further observations of coast-line, soundings, and sailing directions were made in the return journey down the coast.

The paper will be published, with a chart of the coast, in the 'Journal,' vol. xxxviii.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Letter to Sir Roderick I. Murchison, on a Voyage to the North-East Coast of Greenland.* By David Gray, Esq.

"Sir, "Peterhead, 22nd February, 1868.

"I have been much gratified by observing that the Royal Geographical Society has revived, with earnestness, the question of the propriety of organising an expedition with the view of reaching the North Pole. I think it is evident that the voice of the country will not permit the important geographical discoveries which such an expedition would undoubtedly effect, to be longer delayed; and that after so much has been done by British seamen to acquire the experience and information requisite for the successful conduct of such an expedition, it is a point of national honour that it should not be prosecuted otherwise than by their energies and exertions.

"As I am about to sail on a voyage to the Arctic Seas, and as the question will no doubt receive farther discussion in my absence, I may be permitted to offer for consideration the views which much thought, and experience of many years of Arctic navigation have led me to entertain regarding the route by which, as it appears to me, the Pole may be most easily reached, with the greatest amount of economy and safety to the expedition which may be engaged in that service.

"The views of Capt. Sherard Osborn and the other distinguished navigators who have written and spoken on this subject, and who recommend Spitzbergen, Behring's Straits, and Baffin's Bay, as the three routes by which the Polar Sea may be reached, are entitled to every consideration and respect; but I humbly think that none of these possess the advantages of a fourth route, viz., by the East Coast of Greenland, which it is my purpose to advocate in this communication.

"Having for many years pursued the whale fishery on the East Coast of Greenland, and observed the tides, the set of the currents, and the state of the ice in that locality, at various seasons of the year, I think that little, if any, difficulty would be experienced in carrying a vessel in a single season to a very high latitude, if not to the Pole itself, by taking the ice at about the latitude of 75°, where generally exists a deep bight, sometimes running in a north-west direction upwards of 100 miles towards Shannon Island, from thence following the continent of Greenland as long as it was found to trend in the desired direction, and afterwards pushing northwards through the loose fields of ice, which I shall show may be expected to be found in that locality. The following are the reasons on which that opinion is founded:—

"1st. In prosecuting the whale fishery in the vicinity of Shannon Island, there are generally found loose fields of ice, with a considerable amount of open water, and a dark-water sky along the land to the northward; the land water sometimes extending for at least 50 miles to the eastward; and, in seasons when south-west winds prevail, the ice opens up very fast from the land in that latitude.

"2nd. From the comparative rarity of icebergs on the East Coast of Greenland, I conceive that I am justified in inferring that there does not exist any great extent of land to the northward; and if that inference is correct, I am led to the conclusion that there would be less difficulty in pushing a ship to the northward, than if there were comparatively narrow channels to be encountered, as is the case in the route by Smith's Sound.

"3rd. The ice on the East Coast of Greenland is what is termed field or floe ice, the extent of which varies with the nature of the season, but it is always in motion, even in winter, as is proved by the fact that ships beset as far north as 78° have driven down during the autumn and winter as far south as Cape Farewell. Thus there is always the means of pushing to the northward, by keeping to the land ice and watching favourable openings, without the risk of encountering the fast ice prevailing in Smith's Sound.

"4th. I have observed, on landing on Pendulum Island early in the month of August, that the rise and fall of the tide did not appear to exceed four feet. On that occasion, the land water extended 60 miles to the south-east, the ice in it being in such a condition that it was scarcely necessary to change the ship's course for it; and on ascending the highest of the Pendulum Islands—the altitude of which may be judged of from the fact that it can be seen from sea at a distance of upwards of 60 miles—the open water extended to the northward as far as the eye could reach, with a dark-water sky beyond.

"5th. The current generally sets in a south-west direction, and the drift of the ice, with moderate northerly or north-easterly winds, is from 8 to 10 miles a day, sometimes reaching, with a strong north-easterly gale, as much as 20 miles a day. South-west winds, on the other hand, have the effect of causing the ice to open out, leaving large open lanes between the pieces; and I have no there were as many as 1000 boats. When off Round Island, the position of the most easterly point of Labrador was fixed by observation, and the longitude as given on charts, found to be in error, by 10″ 30‴ too far east. In short, the result of the survey by the *Gannet* was to prove that the whole of the coast had been erroneously placed by previous imperfect surveys 10 or 11 miles too far to the eastward. In "Indian Tickle" Harbour, 126 cod-fish were taken by the officers of the ship in less than half an hour by hook and line, sometimes two fish by one line. The distance from "Cutthroat" to Webeck was found to be 44 miles; by the chart it was 27. Webeck was reached on the 8th of August, and surveyed during the following days. From the top of the island Commander Chimmo counted 52 large icebergs aground in the offing. After completing the survey of Webeck and Indian harbours, the ship, on the 20th August, proceeded northwards, having embarked an Esquimaux pilot named John Tooktooshner. Aillik, a Hudson Bay settlement, was next visited, and afterwards Hopedale, where there is a numerous settlement of Christianised Esquimaux. On the 23rd of August the survey of the harbour was commenced and finished on the 26th, in the midst of a north-westerly gale. Hopedale was the limit of the voyage northwards, and further observations of coast-line, soundings, and sailing directions were made in the return journey down the coast.

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"6th. In the event of an expedition prosecuting the route I have recommended, it would certainly, without difficulty, and with favourable winds in not more than fourteen days, reach Shannon Island, which would serve for a land base for its future operations, unless one were desired farther north, which could be obtained. Thus, supposing the expedition to sail in the early part of the month of June, it would reach the field of its operations in six weeks less time than it would take to reach the entrance of Smith's Sound; and, instead of having only a short time in the month of September available for its object if it went by the Smith's Sound route, it would have before it the greater part of the month of July, the month of August, and the half of September for its work, in which time its object might be accomplished.

"7th. Supposing it were necessary for the expedition to winter, there are apparently many bays and good harbours on the East Coast of Greenland available for that purpose; and, from the indications which I have observed, there seems to exist there an average amount of animal life compared with the other Arctic districts.

"It is desirable that, before the despatch of another Arctic expedition, as many views on the subject should be obtained as possible, and I trust that this may be accepted as my apology for troubling you with this communication.

"I have the honour to be, sir, your obedient servant,

"DAVID GRAY."

2. *Memorandum on the Comparative Progress of the Provinces now forming British Burma under British and Native Rule.* By Colonel ALBERT FYTCHE.

Rangoon, 23rd August, 1867.

BRITISH Burma affords means of drawing a fair comparison between British and Native administration, because it has in immediate contact with it, as a Government, the very power from whose dominions the province was obtained. In 1826 the provinces of Arakan and Tenasserim were annexed to the British territories from the Burmese power, still leaving to the King of Ava the whole of the northern portion of his dominions, as well as the important province of Pegu, formed of the lower portion of the valley of the Irrawaddy River, and its delta. We thus obtained possession of the least productive portion of the Burmese Kingdom, while the King retained the magnificent lands of Pegu, with the valuable outlet of Rangoon, to which point foreign trade had solely been drawn. A reference to the map will show that the province of Pegu was fairly interposed between the newly acquired districts, in a position easily to withdraw from them both population and trade, provided Native rule had proved more attractive to either. These conditions, then, seem to furnish a fair test—only that the presumption was in favour of the Native dynasty, in virtue of its holding a far richer and more accessible country.

In the East there is probably no better general test of the advancement of a country than the rise or fall, the ebb or flow of its population. A steady increase in the population indicates, in fact, a prosperous people, a firm and stable Government, and an absence of oppression. It produces, especially where the proportion is not in excess of the capabilities of the soil, extended cultivation and increased trade. If, then, it can be fairly shown that the population of the provinces composing British Burma has increased at a rate which far exceeds the numbers to be obtained from natural increase, and must be attributed to immigration; that in one instance, where the locality whence the immigration was drawn became British, the exodus ceased; while the flow from Native states into British districts, more accessible, continued; and that, where detailed statistics are available, it will be seen our frontier districts have increased at the highest ratio, then we may conclude that British administration in Burma has proved its superiority over Native rule. In British Burma the population returns are fairly reliable, because they are susceptible of easy check from the capitation tax in force in these provinces. This tax is levied from all male adults, and the revenue received therefrom—actual money paid into the Treasury at fixed rates per head—has shown a proportional increase, corresponding with the rise in population.

It is well known that when Arakan and Tenasserim first came into our possession, in 1826, they were almost depopulated, and were so unproductive that it was seriously deliberated whether they should not be restored to Burma. The following figures will show how much these apparently unprofitable acquisitions prospered under our administration.

In 1826 the province of Arakan, with an area of 18,630 square miles, had a population of only 100,000 souls; these were the indigenous population. In 1835 this had risen to 211,536, of whom not more than 6000 were foreigners. In 1845 the population numbered 309,608, an increase of 50 per cent. in the decade, and in 1855 reached 366,310, or 15 per cent. in the decade, but in 1852 Pegu had become a British possession, the effect of which was immediately felt in Arakan; still the total increase in Arakan, during the twenty-nine years, was 250 per cent. of the indigenous population, or an average of 50 per cent. in each decade.

Now turning to Tenasserim, we find that in 1829, three years after the annexation, the population in a province with an area of 28,000 square miles was estimated at a little over 70,000 souls. In 1835 it had risen to 84,917, or 21 per cent. in six years. In 1845 to 127,455, or 50 per cent. in the decade. In 1855 to 213,692, or 69 per cent. in the decade. In other words, it had increased by 200 per cent. in twenty-six years. The actual increase in the home population of England and Wales (after the loss from emigration) has been about 12 per cent., in each decade of the last fifty years.

To support the above returns, we will give the statistics of revenue and assessed cultivation during the same period. The revenue of Arakan, which in 1826 was 23,225*l.*, rose as follows:—In 1835 to 52,832*l.*; in 1845 to 68,455; and in 1855 to 127,729*l.* The area of assessed cultivation, commencing in 1830 with 66,227 acres, advanced in 1835 to 133,952; in 1845 to 233,769; and in 1855 to 353,885 acres, while the value of the entire trade in the same year amounted to 1,876,998*l.* In Tenasserim the first year's revenue in 1825-6 was 2,676*l.* In 1835-6 it had risen to 33,953*l.* In 1845-6, 52,525*l.*, and in 1855-6 had reached 83,300*l.*; while the total trade amounted to 836,305*l.* Land under cultivation was not assessed by area in the earlier years of our occupation, and we have no returns on that head until 1843, when 100,657 acres were assessed. This in 1845 had increased to 119,869, and in 1855-6 to 181,681.

Now from 1826 until 1852 the provinces of Arakan and Tenasserim had as a competitor, both for trade and population, the Burman territories with a frontier of some 800 miles, across which our subjects were free to go, as far as we were concerned; but not free to come, because the Burman authorities strongly opposed emigration, and put serious obstacles in the way of any of their people migrating to our territories. Yet the immense increase of population shows that very large numbers were attracted to our rule.

Pegu came into our possession in 1852, with an estimated population of 500,000 souls, and an area of 33,400 square miles, or a ratio of 15 persons to the square mile. In 1855 it is returned at 631,640 souls, or nearly 19 to the square mile. It will be remembered that Arakan, commencing in 1826 with a ratio of 5½ persons to the square mile, had risen in 1855 to a ratio of 20 persons; and Tenasserim, from a ratio of 2½ persons in 1829, had increased to 7 persons per square mile in 1855. But it would seem that in the beginning of the century the population of the true Burman Empire (that is Upper Burma, as now constituted, Pegu and Martaban) was estimated by various authorities at from 20 to 23 persons the square mile; and if this were the general average, it may be concluded that the fertile province of Pegu, containing the valley of the Irrawaddy, with that river as the highway from the seaport town of Rangoon to Ava, the capital of the empire, must have had a higher rate than the remainder of the country. But taking the population of Pegu at 23 persons to the square mile in 1826, we can then compare the position of the territories, British and Native, after 29 years of mutual contact, thus:—

		1826. Population.	1855. Population.
Native	Pegu	769,120	719,640
British	Arakan	100,000	341,310*
	Tenasserim	70,000	213,692
	Total	939,120	1,274,642

Now we know that the gross increase in Arakan and Tenasserim in these 29 years was 885,000 souls, from which—allowing the natural increase during that period to have been 75 per cent. on the original population—we may deduct 127,500 on that account, and this will leave us 257,500 souls as the emigration from Pegu and the other native Burman states into British territory; and if we compare Pegu (including Martaban) fairly estimated in 1826 with Pegu (including Martaban) even in 1855 (three years after it came into our possession, during which period its population is believed to have risen from 588,000 to 719,640), we find it with nearly 50,000 less population at the latter than at the former period. This is an astonishing result, when placed against the immense progress of the British territories in its immediate neighbourhood.

Having thus brought up these provinces to 1855, we shall now trace their progress since that period. The province of Pegu, as has been said, came into our possession in 1852; but making allowances for the distressed condition of a country after a campaign, and for the imperfect returns incidental to a newly organised administration, we may pass over the years up to 1855, and from that date commence our deductions.

Now, as to the province of Pegu: it faces, with a perfectly open frontier of (say) 200 miles, the still existing Burmese territories under the King of Ava, so that it is fairly pitted against the possibly superior attractions of Native rule. From our territories any subject of ours is free to move into Upper Burma whenever he desires, whereas there is a steady opposition shown to any emigration from the King's dominions into ours. So strong is this that when families of cultivators wish to cross they are frequently obliged to do so by stealth at night, bringing possibly their cattle and carts, but abandoning their houses and much property. In the face of these difficulties, we find that Pegu, first a separate province, now a division of British Burma, had in 1855 a population of 631,640 souls, which in 1865 had risen to 1,350,989. That is, more than doubled itself in ten years,—the exact increase being 113 per cent. The proportion of population to area had increased from 19 to 40 per square mile. If we allow a natural increase of 25 per cent. during the decade in question, we may deduct 157,910 on that account; and 20,000, the number of foreigners, from 719,349, which is the total gross increase; and these deductions will leave us an immigration of the indigenous population into our territories of the enormous number of 561,439 souls in the ten years from 1855 to 1865.

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* Not including foreigners.

The foregoing data seem to establish, beyond any doubt, that during the whole period of British administration of the provinces of Arakan, Tenasserim, and Pegu, they have, in addition to an allowed natural increase of population far higher than we have any historical authority for supposing they ever reached under Native rule, withdrawn and absorbed enormous numbers of people from the neighbouring Native states, which may be summarized as follows:—

Into Tenasserim and Arakan, 1826 to 1855	257,500
,, Pegu, from 1855 to 1865	561,439
,, Tenasserim, from 1855 to 1865	113,295
Total	932,234

And when we look to those Native powers which have been our competitors during this period the picture is reversed. In the dominions of the King of Burma, including the tributary Shan States, we find everywhere signs of progressive decay; a discontented people abandoning his territory; a decreasing revenue; the area of cultivation lessening yearly; and the weakness of the Government shown in the rebellions and outbreaks which so regularly occur. During this year (1867), had it not been for the rich granaries of Pegu that supplied Upper Burma with rice, a famine would have succeeded the civil war which raged last year. The natives of Upper Burma themselves indicate truly the process now being undergone by the British and Native dominions. " Here," they say, "in British Burma your villages are becoming towns, but with us in Upper Burma our towns are becoming villages."

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3. *Extract from a Letter from Captain Cadell, commanding the South Australian Exploring Expedition on the North Coast of Australia.*

(Communicated by F. S. DUTTON, Esq., F.R.G.S.)

" South Australian Exploring Steamer *Eagle*,
Coepang, Timor, 27th Nov., 1867.

" I LAST wrote from Burke Town. I have since made some rather important discoveries, of which the principal are, viz.: the discovery of the mouth of the Roper, in lat. 14° 45′ S. It is a noble river, fully up to Leichhardt's description; and good pastoral country will be found on its banks,—the best, indeed, I know of in the northern territory. Proceeding northwards, a moderate sized river flows into the gulf, in lat. 14° 27′ S.; whilst a smaller was met with in lat. 14° 5′ S. A fine haven, with an area of some 50 square miles, and several rivulets; also one moderate sized river flowing into it was entered in lat. 12° 33′ S. and long. 136° 55 E.

"Immediately to the northward of Probable Island, near Arnhem's Bay, represented by Flinders, under the most pardonable conditions, as dry land, I sailed up a deep bay 20 miles in depth by 10 in breadth, with *three* large rivers disemboguing their waters therein. The *Eagle* entered one with 5 fathoms on the bar. Another, with an equal depth, was thoroughly examined by the boats. This bay, which I propose to name after his Grace the Secretary for the Colonies, is separated from the strait I had previously discovered by a narrow peninsula. On the north coast a fine river, with a remarkably easy entrance, was found betwixt Points Guion and Turner. Three low dangerous rocks, in the very closest proximity to which Flinders unwittingly passed in the night, are situated in a N.E. by N. ½ N. bearing from Cape Arnhem, distance 13 miles. I purpose naming them after Sir Roderick, appropriately the patron saint of any geographical discovery. Some minor dangers, &c., have also been charted during the progress of the expedition. We have been rather debilitated lately; however, the surgeon reports the sick to be improving rapidly on the first supplies obtained here.

"After my examination of the coasts of the northern territory, I am decidedly of opinion that the estuary of the Liverpool offers by far the best site for its capital, and will recommend it accordingly. I am also of opinion that Finniss' preference to Adam Bay over the Victoria was a wise one. The river is rapid and dangerous; whilst the country situated on the navigable portion of its waters is of the most wretched, stony, and barren description, with the heat intense, causing the expedition to suffer more than during any period of its explorations.

"I feel convinced of the possibility of executing the necessary surveys for the 300,000 acres during the good season of the south-east monsoon of 1868. Everything at Escape Cliffs was found in exactly the same order as it was when abandoned. The natives actually had touched neither the buildings nor any of their contents. They had permitted even the bananas to rot on the trees rather than take them. They reported the stock to be doing well, and they themselves were very friendly during our short sojourn. We have never had the slightest animosity from the north territory Aborigines, but the greatest assistance in procuring fuel and water has generally been afforded by them. I must now close, as the ship is ready and steam up."

PRIZE MEDALS

OF THE

ROYAL GEOGRAPHICAL SOCIETY.

THE Council of the Royal Geographical Society, in pursuance of the intention expressed in their Annual Report, May, 1868, have invited the following 37 Schools, containing in the aggregate about 12,700 boys, to compete, in 1869, for their Annual Prize Medals.

List of Schools invited to compete, in 1869, *for the Medals of the* ROYAL GEOGRAPHICAL SOCIETY.

*English Schools.**—Birmingham, King Edward's School; Brighton College; Cheltenham College; Clifton College; Dulwich College; Eton College; Greenwich, Royal Naval School; Haileybury College; Harrow; Hurstpierpoint; Liverpool College; *London*,—Charter House, Christ's Hospital, City of London School, King's College School, Merchant Taylors', St. Paul's, University College School, and Westminster;—Manchester School; Marlborough College; Repton; Rossall; Rugby; Shoreham; Shrewsbury; Uppingham; Wellington College; Winchester.

Scotch Schools.—Aberdeen Grammar School; Edinburgh Academy; Edinburgh High School; Glasgow High School.

Irish Schools.—Ennis College; Enniskillen Royal School; Dungannon Royal School; Rathfarnham, St. Columba's College.

The following Circular Letter has been sent to the Head Masters of the invited Schools:—

Royal Geographical Society, 15, Whitehall Place, London, S.W.

SIR,—By order of the President and Council I have the honour to inform you that the Royal Geographical Society propose to encourage the study of Geography in Great Britain, by the offer of prizes for general competition among the boys of the principal Schools, as indicated in the accompanying list.

The Royal Geographical Society offer two Medals of Gold, and two of Bronze, one of each to successful Candidates in an annual Examination in Political Geography and in Physical Geography respectively. The Society will also publish the names of such other boys as may have eminently distinguished themselves in the Examinations.

The Examination will take place on the first Monday in May, 1869, and will be repeated in each succeeding year until further notice.

The Examination will be conducted by means of sealed papers of questions, appropriately the patron saint of any geographical discovery. Some minor dangers, &c., have also been charted during the progress of the expedition. We have been rather debilitated lately; however, the surgeon reports the sick to be improving rapidly on the first supplies obtained here.

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* These include the nine Schools of the Royal Commission of 1864, and all others that, according to the latest edition (1866) of the 'Public School Calendar,' contain not less than 200 boys.

"After my examination of the coasts of the northern territory, I am decidedly of opinion that the estuary of the Liverpool offers by far the best site for its capital, and will recommend it accordingly. I am also of opinion that Finniss' preference to Adam Bay over the Victoria was a wise one. The river is rapid and dangerous; whilst the country situated on the navigable portion of its waters is of the most wretched, stony, and barren description, with the heat intense, causing the expedition to suffer more than during any period of its explorations.

"I feel convinced of the possibility of executing the necessary surveys for the 300,000 acres during the good season of the south-east monsoon of 1868. Everything at Escape Cliffs was found in exactly the same order as it was when abandoned. The natives actually had touched neither the buildings nor any of their contents. They had permitted even the bananas to rot on the trees rather than take them. They reported the stock to be doing well, and they themselves were very friendly during our short sojourn. We have never had the slightest animosity from the north territory Aborigines, but the greatest assistance in procuring fuel and water has generally been afforded by them. I must now close, as the ship is ready and steam up."

sent simultaneously to the invited Schools. A copy of the several forms to be used in connexion with the Examination, is appended to this letter.

The only limitations in respect to the competition are as follow:—

Four boys *only* in each of the invited Schools can be admitted to the Examination in Political Geography, and the same number to that in Physical Geography.

No boy can compete in both subjects in the same year.

A Medallist may not again compete for the same Medal.

The President and Council will be glad to be informed whether any boys from the School over which you preside, are likely to compete. They will give due consideration to any remarks or suggestions you may think proper to make in reference to the Examinations of future years.

I am, Sir, your obedient servant,
H. W. Bates,
Assistant Secretary.

To the Head Master of —— School.

Forms used in the Examinations of the Royal Geographical Society.

Form No. 1.

Royal Geographical Society, 15, Whitehall Place, London, S.W.

Sir,—I beg to remind you that the School over which you preside is among those invited by the Royal Geographical Society to compete for their annual Medals, as is stated in the list, a copy of which you will already have received.

The number of Candidates from your School is strictly limited to four in Political and to four in Physical Geography. No boy can compete in the same year for both subjects.

The Examinations will take place simultaneously at the several Schools on the first Monday in May (viz. May ——, 18—), between the hours of 9 and 12 A.M., and 2 and 5 P.M., by means of papers of questions, to be hereafter sent under seal to you and to the Head Masters of the other invited Schools.

If any among your scholars, subject to the above limitations in respect of number, desire to accept the invitation of the Royal Geographical Society, I beg you will send me a list of their names, ages, residences when at home, and the subject—whether Political or Physical Geography—in which they severally desire to compete.

It will be essential to their admission to the competition, that you should send me this return not later than April ——.

I am, Sir, your obedient servant,
H. W. Bates,
Assistant Secretary.

Form No. 2. Letter of Instructions.

Royal Geographical Society, 15, Whitehall Place, London, S.W.

Sir,—I beg to inform you that the papers for the ensuing Examinations in Geography will be forwarded by post on ————, the —— day of ————, in a parcel addressed to you at ————.

You will have the goodness to let me know by post, or by telegraph if necessary, if the parcel is not duly delivered to you on the following morning, so that I may, if required, send duplicate papers in time for the Examination.

The outer wrapper of this parcel should be opened as soon as it is received, when you will find the papers for the morning and the evening enclosed in separate envelopes. The seal of each separate envelope is to be broken in the presence of the assembled Candidates, at the commencement of the time appointed for the Examination. This direction, as well as the *order* and *hours* prescribed for the examination, must be *strictly* observed.

There must be neither globe, map, nor any other geographical illustration in the room where the examination is held.

Writing-paper of foolscap size, blotting-paper, twine or tape, and pens and ink should be provided for the use of the Candidates.

Three hours *only* are allowed for each paper.

All writing must cease at the end of three hours to a *moment*, notice of the time having been given to the Candidates ten minutes previously.

At the appointed hour the papers should be collected; those on each subject separately. One Master at least must be present during the whole time assigned to each paper, and it will be his duty to expel any Candidate who shall be guilty of unfair dealing in the Examination. I beg to invite your careful attention to the accompanying "Advice to Candidates" and to the terms of the "Form of Declaration" to be sent with the papers, which will have to be signed by *all* the Masters present during the working of the several papers. After the Declaration has been filled up and signed, it should be tied up with the papers, and the whole should be sealed up and forwarded to me.

This must be done separately for the papers both morning and afternoon.

The Council of the Royal Geographical Society implicitly rely on your honour and judgment to enforce these regulations with scrupulous care, and to adopt the most effectual precautions against the possibility of communication between Candidates in the Examination-room, or any other irregularity.

I am, Sir, your obedient servant,

H. W. BATES,

Assistant Secretary.

FORM No. 3.

ADVICE TO CANDIDATES.

When the paper is given to you, *first* look to the instructions printed at the head of it, and *then* read the questions carefully over, marking those which you think you can answer best. Do them first, and, if any time remains, you may try some of the others; but do not exceed the number of questions appointed to be answered. Remember that a few accurate and sensible answers will gain a higher number of marks than a great number of indifferent attempts.

Write your full Christian and surname at the head of the first page, and your surname, at least, at the head of all the others.

Write *legibly* and *neatly*, leaving a margin unwritten upon.

Write only on one side of the page.

As far as possible, avoid prolixity in your answers.

As soon as notice is given (ten minutes before the end of the time) finish your papers, see that they are numbered rightly, and paged in their proper order. Fasten them with twine or tape at the upper left-hand corner, and leave them *unfolded* at your seat.

CAUTION.

Any Candidate attempting to take unfair advantages: such, for example, as having in his possession *any* book or written paper, or seeking or receiving assistance from another, will be immediately expelled from the Examination.

No Candidate may speak to another Candidate, on any pretence whatever, under pain of expulsion.

Whoever gives assistance will be treated in the same manner as he who receives or asks for it.

FORM No. 4. DECLARATION.

School of ——————.

We, the undersigned, hereby declare that the papers on —————— Geography, which are forwarded herewith, were worked, in our presence, by the —— Candidates whose names they respectively bear, without any assistance whatever from books, notes, or memoranda, from each other, from ourselves, or any other person, and that there was no globe, map, nor other geographical illustration in the room where they were written. We declare that all the other regulations contained in the Letter of Instructions were faithfully observed, and that we were present uninterruptedly during the whole of the time respectively specified after our names.

Name, designation, and address of Masters of the School who were present during the working of the papers referred to in the above Declaration.	A. B., &c., from to . C. D., &c., from to .

N.B.—*The Masters of the School will appreciate the importance of this Declaration. The strict observance of the conditions prescribed by the Royal Geographical Society in their "Letter of Instructions" and "Advice to Candidates," is essential to secure equal justice to the several competitors.*

Syllabus of Examinations for the Prize Medals of the ROYAL GEOGRAPHICAL SOCIETY.

EXAMINATION IN POLITICAL GEOGRAPHY.

This Examination will take place simultaneously at the several invited Schools, according to the printed regulations, on the first Monday in May, 1869, and will consist of two papers of three hours each; the one to be answered between 9 and 12 A.M., and the other between 2 and 5 P.M.

No. 1 Examination Paper will consist of questions on the following subjects:—

A. *Descriptive Geography.*—The nature of latitude and longitude. What are the distances, speaking roughly, and as learnt by the careful study of a globe, between such remote places as may be specified?. What places of importance lie on the direct way between them? What is the relative size, speaking roughly, of such well-known countries, mountains, and rivers, as may be specified?

Three or more "Aspects of Nature" named in the following list will be selected, and the Candidates will be required to describe their geographical features, especially in their relation to human wants and manner of life, illustrating their answers by special examples. *List of Selected Aspects of Nature:*—jungle; pine-forest; tropical forest; llanos; bush in South

Africa; scrub in Australia; moor; fen; bog; lagoon; mangrove-swamp; large river in temperate zone; large river in tropics; periodical river in arid country; delta; large fresh-water lake; large salt-water lake; alluvial plain; savannah; desert; stony desert; high mountain chain; glacier; moraine, ancient and modern; plateau; steppe; Polar scenery; coral island; volcano.

Extra marks will be allowed for sketches, but only so far as they are effective illustrations of what cannot otherwise be easily expressed. No encouragement will be given to artistic merit, *per se*.

B. *Historical Geography.*—Embracing (1) the boundaries of states and empires at different historical periods; (2) the chief lines of commerce, ancient and modern; (3) the topography of great capitals; (4) the influence of geographical features and conditions upon the distribution of races and political history of mankind.

No. 2 Examination Paper will consist wholly of questions on special subjects.

The special subjects appointed for 1869 are:—

A. *Geography of Palestine*, descriptive and historical.

B. *Geography of Plants useful to Man*, considered with reference to the conditions of growth, to the distribution, and to the applications of the plants and their products named in the following selected list:—*Cereals*—wheat; barley; rye; oats; maize; rice; doora. *Other Farinaceous Plants*—sago-palm; mandioca; potato; yams. *Fruits*—date; banana; bread-fruit; grape; orange; cocoa-nut. *Textiles*—cotton; flax; hemp; jute. *Oils*—olive; palm. *Sugar-producing Plants*—cane; beet-root; date; maple. *Spices and Stimulants*—tobacco; pepper; tea; coffee; chocolate; maté. *Gums and Resins*—the various kinds of India-rubber; gutta percha.

EXAMINATION IN PHYSICAL GEOGRAPHY.

This Examination will take place simultaneously at the several invited Schools, at the same hours and under precisely the same regulations as those in Political Geography.

No. 1 Examination Paper will consist of questions on the following subjects:—

A. *Configuration of the Earth*, as learnt by careful study of a globe. What are the distances, speaking roughly, between such remote places as may be specified? What places of importance lie on the direct way between them, and what is the section along it? What is the relative size, elevation, &c., speaking roughly, of such well-known districts, mountains, and rivers, as may be specified?

B. *Selected Aspects of Nature.*—Three or more of the aspects of Nature named in the following list will be selected, and the Candidates will be required to answer questions upon their physical characteristics, and the theory of those characteristics, illustrating their answers by special examples. *List.*—Chief mountain-forms; glaciers and moraines; volcanoes; deserts, sandy and stony; mines; gold-fields; lakes, fresh and salt; phenomena of Polar regions; rivers, river-basins and watersheds.

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Extra marks will be allowed for sketches, but only so far as they are effective illustrations of what cannot otherwise be easily expressed. No encouragement will be given to artistic merit, *per se*.

C. *General Physical Geography.*—Prominent features of the distribution of climate, rain, winds, ocean currents, minerals, vegetation and animal life, magnetism.

No. 2 Examination Paper will consist wholly of questions on special subjects.

The special subjects appointed for 1869 are:—

A. *Physical Geography of Palestine.*

B. *The Physical Geography of the Mediterranean Sea, and of its basin.*

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[Issued July 15th, 1868.]

SESSION 1867-8.

Twelfth Meeting (Anniversary), 1 p.m., *May 25th*, 1868.

Sir RODERICK I. MURCHISON, Bart., k.c.b., President, in the Chair.

The Secretary, Mr. R. H. Major, read the Rules for the conduct of the Anniversary Meetings of the Society and the Minutes of the last Annual Meeting. The President then nominated, as Scrutineers of the Ballot, Charles White, Esq., j.p., and Dr. Webster.

The following new Fellows were elected:—William Dell, Esq.; J. S. A. Dunbar, Esq.; the Hon. Anthony Forster; Sir Francis Goldsmid, Bart.; Rev. William Green, m.a.; Lieutenant-Colonel William Gray, m.p.; Captain Henry M. Jones, v.c., &c.; Daniel M. Kisch, Esq.; Francis D. Lambert, Esq.; George William Nicol, Esq.

The Report of the Council was then read, and its adoption put to the Meeting and carried,

Professor W. Hughes, of King's College, asked permission to express the extreme gratification with which, as an old Fellow of the Society, he had listened to the passages in the Report relating to the offer of Prizes for Geography to the chief public schools. He felt grateful to the Council for this additional encouragement to the cause of geographical education. Few had more reason than himself to know how much the study of geography needed such encouragement in our schools and colleges. As a teacher of geography during upwards of a quarter of a century, he was perfectly convinced that we should never, in our high-class institutions, have a due regard paid to this subject until we had some such direct encouragement as that which the Council of the Geographical Society proposed to offer.

The PRESIDENT then proceeded to deliver the Royal Medals for the encouragement of geographical science and discovery. The FOUNDER'S MEDAL to Dr. A. PETERMANN, of Gotha, for his important services as a writer and cartographer in advancing the science, and for his well-known publication, the 'Geographische Mittheilungen,' which for twelve years has greatly aided the progress of geography. The PATRON'S GOLD MEDAL to Mr. GERHARD ROHLFS, for his extensive travels in the interior of Northern Africa, and especially for the great journey in which he traversed the continent from Tripoli to Lagos, in the Gulf of Guinea. A gold watch was also awarded to the Pundit employed by Captain T. G. Montgomerie for the route-survey made from Lake Manasarowar to Lhasa, in Great Thibet. Dr. Petermann received both medals, replying for himself and M. Gerhard Rohlfs, who is now in Abyssinia. The Pundit was represented by Viscount Strangford, who received the watch and replied in his behalf.

The sum of Five Pounds was presented to Mr. W. J. WILSON, being the annual prize for geography offered by the Society in the Society of Arts' Examination. Mr. Wilson was presented by Mr. Le Neve Foster, Secretary of the Society of Arts.

On the motion of Admiral Sir GEORGE BACK, seconded by T. H. BROOKING, Esq., the following alteration was ordered to be made in the Regulations, whereby Fellows in future will be restricted, in consequence of the want of space, to the admission of one friend only at the evening Meetings:—

> "That the last two lines of Article II., Section iii., Chapter 5, of the Regulations be omitted: viz., 'but should a Fellow desire to introduce a second [visitor], he can do so by applying to the Secretary for a special card of admission.'"

The following Resolution on the subject of a portion of the premises (stables) leased by the Society, which have been taken by the Waterloo and Whitehall Railway Company, was proposed by A. G. FINDLAY, Esq., seconded by W. BOLLAERT, Esq., and adopted by the Meeting:—

> "That the arrangement entered into between the Trustees of the Royal Geographical Society and the Waterloo and White-

> hall Railway Company, whereby the purchase-money for the sale to the said Company by this Society of certain leasehold hereditaments, situate in Great Scotland Yard, in the parish of St. Martin-in-the-Fields, in the county of Middlesex, and held in trust for this Society (and which Premises are required for the purposes of the Waterloo and Whitehall Railway, and are numbered 10 in the Parliamentary Plan and Book of Reference of the said Railway deposited in the Office of the Clerk of the Peace for the county of Middlesex), was determined at the price or sum of 150*l.*, be and the same is hereby approved and concurred in by this Meeting; and that the Council be and are hereby authorised to carry such arrangement into effect, and to complete the said sale, and to affix the seal of this Society to the Assignment of the said Premises."

The PRESIDENT then delivered his Annual Address on the progress of geography. At its termination, Admiral R. COLLINSON proposed a vote of thanks to the President, with a request that he would allow the Address to be printed. The motion was seconded by C. WHITE, Esq., and carried unanimously by the Meeting.

At 3 P.M. the result of the Ballot for the President and officers of the ensuing year was reported by the Scrutineers.

The following gentlemen were declared elected: the names in italics being those of the new Committee, and those who change office:—*President:* Sir Roderick Impey Murchison, Bart., K.C.B., F.R.S., &c. *Vice-President:* Vice-Admiral Sir G. Back, D.C.L., F.R.S.; Francis Galton, Esq., M.A., F.R.S.; *Viscount Strangford;* Major-General Sir A. Scott Waugh, F.R.S. *Trustees:* Lord Houghton; Sir Walter C. Trevelyan, Bart. *Secretaries:* Clements R. Markham, Esq., F.S.A.; R. H. Major, Esq., F.S.A. *Foreign Secretary:* Cyril C. Graham, Esq. *Council:* Right Hon. H. U. Addington; John Arrowsmith, Esq., F.R.A.S.; Major-General G. Balfour, C.B., R.A.; Sir Samuel Baker; Thomas H. Brooking, Esq.; *Rear-Admiral R. Collinson,* C.B.; James Fergusson, Esq., F.R.S.; A. G. Findlay. Esq.; Right Hon. Sir Thomas F. Fremantle, Bart.; *Sir H. Bartle Frere,* K.C.B.; *Captain E. A. Inglefield,* R.N., F.R.S.; Captain Felix Jones (late I.N.); Herman Merivale, Esq., C.B.; Captain Sherard Osborn, R.N., C.B.; Captain George H. Richards, R.N.; *Major-General C. P. Rigby,* C.B.; *Major-General Sir Henry C. Rawlinson,* K.C.B., M.P.; Sir Charles Nicholson, Bart.; Thomas Thomson, Esq., M.D., F.R.S.; *Lord Wharncliffe; Sir Harry C. Verney, Bart.,* M.P. *Treasurer:* Reginald T. Cocks, Esq.

A vote of thanks to the retiring Vice-President, members of Council and Committees, and to the Auditors and Scrutineers, was proposed by Keith Johnston, Esq., and seconded by F. Trestrail, Esq., after which the Meeting separated.

PRESENTATION

OF THE

ROYAL AWARDS.

(*At the Anniversary Meeting, May* 25, 1868.)

THE Founder's Gold Medal is awarded to Dr. AUGUSTUS PETERMANN, for his important services as a Writer and Cartographer in advancing our Science, and for his well-known publication the 'Geographische Mittheilungen,' which for twelve years has greatly aided the progress of Geography. The Patron's Gold Medal to M. GERHARD ROHLFS, for his extensive travels in the interior of Northern Africa, and especially for the great journey in which he traversed the continent from Tripoli to Lagos in the Gulf of Guinea.

In presenting the Founder's Medal to Dr. Petermann, the PRESIDENT addressed him in the following words:—

"Dr. PETERMANN,—

"The terms of the award of a gold medal, as approved by the Council, express in brief outline your deserts as a geographer. I need scarcely say that in this decision I heartily concur. The spirit and ability with which you have so successfully conducted for the last twelve years the publication of the 'Mittheilungen' have called forth our entire approbation, and have aided the diffusion of a taste for scientific geography throughout all civilised countries. For, whilst popularising the science by the continuous issue of clear explanatory maps and highly interesting memoirs, you have striven to give it a wider scope, by connecting it with various collateral branches of knowledge, thus rendering it a grand and comprehensive study.

"The zeal you have displayed in promoting the researches of travellers in distant lands, and the hearty manner in which you have appealed to the public for aid to enable them to carry out their plans, are well known to every reader of the 'Mittheilungen.' In proof of this commendable feature in your career, I may especially advert to your fostering care of Gerhard Rohlfs, your brother Medallist of this day, and your advocacy of the claims of Carl Mauch, on whose adventurous travels in Southern Africa I am about to dwell in my Address. The accuracy with which you so rapidly brought out the results of the recent British explorations in Abyssinia have been highly appreciated by us.

"I must also specially advert to the steady enthusiasm with which you have laboured in the cause of North Polar exploration, until at length you have succeeded in exciting the maritime enterprise of your countrymen in this direction, and have, at your own risk and with your small means, actually raised a sum sufficient to send a Norwegian yacht to the North-east coast of Greenland. Your long-continued studies of Arctic and Antarctic Geography,—including highly instructive maps, representing the comparative amount of exploration towards either Pole, and the physical conditions which determine the currents and temperature of high latitudes, as bearing upon the routes to be followed in attempting to reach the North Pole,—I may truly say, give you another strong claim to our acknowledgment.

"For these substantial reasons, I welcome you once more back to England, and have the sincerest pleasure in presenting you with the Founder's Medal."

Again addressing Dr. Petermann, the recipient of the Patron's Medal on behalf of M. Gerhard Rohlfs, the President thus spoke:—

"In awarding the Patron's Gold Medal to your intrepid countryman M. Gerhard Rohlfs, of Bremen, the Council and myself have been moved by the self-sacrifice and disinterestedness with which this young traveller applied himself to his task, as well as by the extent and importance of the journeys he has accomplished. Commencing in 1861, Gerhard Rohlfs continued for five years exploring the northern part of the African continent. His journeys in Morocco in 1863-4 are the most important that any European has performed, and, in crossing the Atlas southward to the oases of Tuat and Tidikelt, he reached a point farther than was attained by any of the French explorers. On returning *viâ* Ghadames and Tripoli, he made a short visit to Germany, and went back to Africa with the noble purpose of penetrating to Waday, to recover the lost papers of his unfortunate predecessor in bold adventure, Dr. Vogel. Entering at Tripoli he reached Kúka, on the shores of Lake Chád; whence, prevented by the Sultan of Waday from entering his territory, he pushed southwards, and, reaching the Benuwe River at its upper course, followed it to the Niger, and travelled onward by land across the Yoriba country to Lagos in the Gulf of Guinea. All these great undertakings were performed with means so slender as to excite admiration of the hardihood of the man who could undergo so much privation in the cause of science. In his great Morocco journey he travelled for eighteen months at a cost of 80*l.* Fortunately his patriotism and love of science carried him forward, and on his last expedition he was assisted by subscriptions raised in his native town of Bremen and in Berlin, as well as by a contribution of 100*l.* granted by our Society. Since his return the King of Prussia has acceded to his request, to send to the Sultan of Bornu, who protected the traveller whilst in the region of Lake Chád, a royal present, consisting of a new throne, a state-carriage, and a gold watch.

"At the close of our last session, Gerhard Rohlfs visited England on his return from Africa, with his faithful Moorish attendant, and delighted us by his lively description of the wild countries he had traversed, and the difficulties he had surmounted. The scientific results of his journeys have been elaborated by yourself, and published by you, together with the narrative of his travels.

"A traveller so courageous and devoted has well earned this mark of our approval; and it is with pride and pleasure that I deliver to you, who have been his best supporter, the Patron's or Victoria Medal, to be placed in his hands."

Dr. Petermann, having received both medals, replied as follows:—

"SIR,—I receive these Medals with the deepest gratitude. There can be no higher reward to a devoted servant in Geographical Science, no better stimulus to further efforts, than this distinguished mark of approbation of the leading Geographical Society of the world.

"That I have come here to receive these Medals at your own hands, is a living proof how highly I value your approbation and kindness.

"I consider, Sir, that I have done no more than my duty, in endeavouring to add my mite to the stock of geographical knowledge. As, nevertheless, you have done me the great honour to bestow on me your award, I must confess that I owe it in great part to yourself and the Society. For, when I first came to England, 23 years ago, I experienced such kindness among my brother Geographers in this country, that I shall never forget it to the end of my life. And when afterwards, 14 years ago, I followed a call to my own country, I tried to second your noble efforts, and to labour along with you as well as I could. In these endeavours I have at all times been most kindly and liberally assisted by yourself and many British geographers and British authorities all over the world, while I have found in the enterprising geographical establishment of Justus Perthes a suitable sphere of activity, and in my assistant and friend, Dr. Ernest Behm, a hearty co-operator in everything that tends to advance geographical knowledge. Ours is a laborious and tedious work; and, whilst you English are pre-eminently discovering and exploring in all quarters of the globe, we Germans chiefly try to make ourselves useful in the study at home, assisting to digest the information obtained.

"I accept with sincere pleasure the second Medal for my friend Gerhard Rohlfs, an honest and persevering traveller, who, kindly assisted by your Society, has done some good work.

"In his name and my own I offer you, Sir, the Council, and the Members of this great Society, our sincerest thanks. At the same time I cannot but consider it as a national honour; and I am sure that millions of my countrymen will read with pleasure the kind words you have spoken on this occasion.

"To receive these high rewards is a new proof that Science is not bounded by the limits of nations; but that its cultivators all over the world are one united brotherhood. Geography is the most universal of human inquiries. They cannot make war, they cannot make peace without Geographers. They cannot build a railway or lay out a ship's track without maps or surveys, or have trade and commerce without geography; our explorers must find out the gold-fields of the world; and not even a holiday-tour to Switzerland, or elsewhere, can be fully enjoyed without a good map. In fact, Geography is a great pioneer of culture and progress; and, moreover, the privations, hardships, and trials our travellers and explorers have to undergo, are an excellent school for bringing out the good qualities and forming fine characters.

"Having had the honour to be a Member of the Royal Geographical Society for a quarter of a century, I have witnessed with great gratification and admiration its rise, its present eminent position, its prospering condition, and extensive influence; and, while it is a great happiness for me to be once more among you, my hope and great wish is that the Society will advance and become more prosperous than ever."

A Gold Watch, value thirty guineas, awarded to the Pundit employed by Captain Montgomerie, for his route-survey from Manasrowar to Lhasa in Great Thibet, was next presented to Lord Strangford on behalf of the Pundit, now in India.

In presenting the watch, the President spoke as follows:—

"MY LORD,

"I have sincere gratification in placing in your hands this handsome gold watch, which the Council have awarded to that skilful Pundit whose remarkable travels in Thibet will shortly be published in our Journal. In requesting you, at the commencement of this day's proceedings, to receive this reward on behalf of the Pundit, your Lordship stated that Sir Henry Rawlinson was the most fitting person to perform this office, from having proposed the award in Council; but whether preference should be given to your Lordship, to Sir Henry Rawlinson, or to Sir Andrew Scott Waugh, who was so long Director of the Great Trigonometrical Survey, I am sure you will, as a scholar and geographer, deeply versed in Asiatic subjects, willingly respond on behalf of the Pundit, and unite with us all in saying that there never was a gift more worthily obtained. I need not recapitulate all that the Pundit has done. He has laid down, in travelling from Nepaul to Lhasa, and along the great Thibetan road to Lake Manasarowar, a route-survey of 1200 miles of country previously scientifically unexplored, and has taken, besides, a measurement of the city of Lhasa. The details of his journey have been communicated to the Society, in the admirable report of Captain Montgomerie, to whom I beg you will convey our feelings of warm approbation of the skill and energy with which he is instructing these native explorers, and fitting them for important geographical discoveries."

Lord STRANGFORD replied:—

"Mr. PRESIDENT,—You take me a little by surprise in naming me as the deputy of the remarkable Pundit who is to receive this award of the Royal Geographical Society. The rightful sponsor of the Pundit is our still more learned Pundit Sir Henry Rawlinson, on whose suggestion the award was made. But as you have done me the honour to choose me to speak vicariously, I need only say that I acknowledge with gratitude on his behalf the very high honour which you have done him. And in this I see a recognition not only of his services, but also, through him, of the common brotherhood and common intellectual capacity of natives of India with ourselves to share in our scientific honours. I am certain that the award will be duly appreciated at the present time, when the native public of India is being thoroughly educated to express its own wants and its own sentiments through the public press. It will resound through the length and the breadth of the land to the honour of the Society. I cannot leave the subject without speaking in my own person in appreciation of the Pundit's merits, as shown in his great geographical achievement. It is not only that he, a native of the plains, has emulated the Alpine Club, by climbing to a height of 15,000 feet, and showing wonderful endurance of Alpine hardships in journeying for two or three months along a plateau at this height, but also that he has shown extraordinary tact, a wonderful power of conciliation and knowledge of human nature, in overcoming so many political difficulties when accomplishing this really remarkable task. Captain Montgomerie conveys an adequate idea of the man and his work, by saying how much he wishes the President and the Society could get a sight of this man, who has the power of making friends with every one he sees. He had shown himself a conscientious Geographer in taking such continual observations, which had been tested and verified by Captain Montgomerie himself, and in short he had proved himself in every way worthy of Captain Montgomerie's selection."

Mr. Le Neve Foster, Secretary of the Society of Arts, then presented to the President Mr. William John Wilson, as the successful Candidate of the present year for the Royal Geographical Society's Prize of Five Pounds, in the Examinations conducted by the Society of Arts. In delivering the amount to Mr. Wilson, the President congratulated him on having being the first recipient of the Prize who had been publicly rewarded and honoured at the Anniversary Meeting of the Society.

ADDRESS

TO

THE ROYAL GEOGRAPHICAL SOCIETY.

Delivered at the Anniversary Meeting on the 25*th May*, 1868.

BY SIR RODERICK IMPEY MURCHISON, BART., K.C.B.,

PRESIDENT.

GENTLEMEN,

The tide of prosperity, which for some years has marked the progress of the Royal Geographical Society, continues, I am happy to say, to flow on without symptoms of an ebb. Rejoicing as I do in our popularity and usefulness, it becomes me now to state, that I have seen with regret the great difficulties which have occurred in affording sitting room to our greatly-augmented numbers, and the visitors who are introduced to our meetings. Complaints having proceeded from many of our old Associates as to the impossibility of finding places for themselves, the Council were under the necessity of devising a remedy, and the following arrangement has been made:—The large central portion of the hall will henceforward be exclusively occupied by Fellows, the sides only being set apart for ladies and visitors.

Though this plan is as good as present circumstances will admit, it is merely temporary; for the wings of Burlington House, in one of which we have been permitted to assemble, through the courtesy of the Royal Society and the University of London, are ere long to be pulled down; and when the new rooms of the Royal Society are built, no one of them will be large enough to receive the audiences that attend our meetings. Now, as under any circumstance we shall be compelled to raise a great edifice for ourselves, I have the pleasure to announce, that, ever mindful of the coming necessity, the Council have applied to the Chief Commissioner of Woods and

Forests, and obtained a promise that we shall be considered, on the allotment of the ground about to be cleared between Whitehall and the Thames. I trust that an advantageous site may be ceded to us, as the public body which, for the small sum of 500*l.* per annum granted to us by Parliament, keeps up for the use and consultation of the public a well-furnished Map Office.

I may add that it is my hope that when, through the demolition of the building in which we are now assembled, we shall be obliged to seek for a temporary asylum whilst a large edifice is being raised out of our own funds, we may, upon application, be allowed to meet *ad interim* in the grand new hall of the University of London, now nearly finished, the Council of which body, in conjunction with the Royal Society, has hitherto treated us with so much consideration.

In the following review of the affairs of the Society, and the progress of Geography, during the past year, I commence, as on previous occasions, with a notice of the career of the distinguished men lost to us by death, since the last anniversary.

OBITUARY.

MR. WILLIAM JOHN HAMILTON.—By the decease of our former excellent President, Mr. W. J. Hamilton, Geography has lost an enlightened and zealous supporter, whilst I have to grieve for one of my best and most attached friends. Born in London (5th July, 1805), his education was commenced at the Charter House, and completed at Göttingen, where he acquired that facility in German which was of great use to him in his subsequent career.

His first pursuit in public life was diplomacy. He was attached to the mission at Madrid in 1827, in 1829 was removed to Paris as an Attaché to the Embassy, and subsequently became Précis Writer at the Foreign Office, under the Earl of Aberdeen. In this commencement of an active life, he very naturally followed the steps of his eminent father, Mr. W. Hamilton, so long distinguished as a diplomatist, and not less so for his learning and that love of fine art which rendered him in his latter days one of the most efficient of the Trustees of the British Museum. On our part, also, we must never forget that Mr. Hamilton, senior, was the first of our Presidents who delivered one of these Anniversary Addresses, which, since his time, have formed an integral and essential part of the volumes of our Journal. As soon as the father perceived that his son had reached an age when his talents required to be directed to a special pursuit in Science, to be combined with Art, and which would elicit all his energy, he requested me to attract William's attention to Geology. In this way I had not only the satisfaction of giving my friend his first lessons on geology in the field (anno 1835), but also of making him known to the accomplished naturalist, the late Hugh Strickland; and soon after was formed the scientific and antiquarian project of these two fine young men, who embarked together with the noble intention of investigating the Bosphorus and Asia Minor. The son was thus enabled to gratify the wish of his parent in working out the comparative geography of these regions, whilst with his companion he was sure to unravel many phenomena in Natural History.

As respects Turkey in Europe, Hamilton and Strickland speedily threw a new light on the geological structure of the environs of Constantinople; but their friendly partnership was soon dissolved, for Mr. Strickland was compelled to return home on family affairs.

Left to himself, Mr. W. Hamilton carried out and completed that survey of Asia Minor, which, being published in 1842, justly obtained for him a high position among travellers, and elicited the warmest commendation of Baron A. von Humboldt. No one indeed can peruse these volumes, or examine the map which accompanies them, without being struck with the varied qualifications which our deceased associate brought to bear, in illustrating the geography, both physical and comparative, as well as the geology of this remarkable region. More recently, indeed, our Honorary Member, M. Pierre Tchihatchef, after several excursions in Asia Minor, has produced a more complete map, particularly as regards geology; but still, I am sure that my eloquent Russian friend will unite with me in admiring the previous efforts of Hamilton. In fact, the minute notice of every mile on his route, as noted in his Itinerary, the exact time of departure and arrival, the constant observation of each turn of the road with compass in hand, and the minutest notice of every natural feature, was an earnest of what this most persevering and conscientious man was destined to be through life.

In the year 1843 Mr. Hamilton was honoured with the Founder's Medal of the Society for these researches in Asia Minor; and it is a remarkable fact that he and the lamented and excellent Admiral Smyth are the only Presidents who, since the foundation of our Society, have received our Gold Medals for actual journeys and discoveries in geography.

In the sister science of Geology Mr. Hamilton was distinguished, not only as a good sketcher and a clear writer, but also as having been so much looked up to by his associates, that having presided over the Geological Society from the years 1854 to 1856, he was again chosen President in 1864, and served till 1866. Besides his Anniversary Addresses, which are models of accurate research, he had in previous years been of signal use to the Geological Society, by acting as Secretary and Foreign Secretary. His great merits in all these capacities have, indeed, already had justice done to them by Mr. Warington Smyth, the late President of the Geological Society.

In the years 1837-41-42 and 1847, Mr. Hamilton acted as the President of this Society, and his Anniversary Addresses were distinguished by the perspicuous observations with which they were filled, whilst it was his constant and earnest endeavour to improve and fix the principles and regulations by which we have ever since been governed.

In his last Address, when speaking of the means by which the advancement of geographical science was to be best attained,—some persons being of opinion that we should confine ourselves entirely to purely scientific subjects, others preferring descriptive travels and more amusing topics,—Mr. Hamilton very wisely condemned such exclusive practice, and thus left it recorded:—"They whom I am now addressing will probably agree with me, that it is only by a complete union of scientific truth with popular interest, that we can hope to see the science of geography take that hold of the public mind in this country, which shall ensure it the support necessary to secure its efficiency and to maintain it in a healthful and powerful condition."

This principle you well know, gentlemen, has ever guided me since I first presided over you; and it is unquestionably through its steady application that our members have risen from 668, when Mr. Hamilton last presided, to our present potent cypher of 2150 Fellows.

In a public capacity Mr. Hamilton represented the borough of Newport, in the Isle of Wight, in the Conservative interest, from 1841 to 1847. In later years he devoted himself assiduously to the cultivation of several branches of geology, and by a patient study of conchology became an adept in his acquaintance with all tertiary fossils, as testified by various memoirs published in the Quarterly Journal of the Geological Society.

As a President he was highly esteemed for the fidelity, urbanity, and integrity with which he discharged his duties, in the course of which he made many sincere friendships; and I can truly testify that his death, which alas! came upon him at much too early a period, was as deeply lamented by geologists and geographers as it was by a large body of private friends. In addition to his scientific pursuits, Mr. W. Hamilton was an excellent man of business, whether as member of Committees of the House of Commons, or as Chairman of the Great India Peninsula Railway Company, with which body he was connected from the year 1849 till his death on the 27th June, 1867.

He was twice married. By his first wife, Miss Margaret Trotter, to whom he was united in 1832, he had one son, now Lieutenant-Colonel Robert Hamilton, of the Grenadier Guards. By his second wife, the Hon. Miss Margaret Dillon, he has left three sons and four daughters, all surviving; and who, with their excellent and affectionate mother, deeply deplore their loss.

Among the scientific distinctions of Mr. W. Hamilton, it is to be noted that he had not only presided with credit over the Royal Geographical and Geological Societies, but that he was also a Fellow of the Royal Society, and a Honorary Member of various Foreign Scientific bodies.

The EARL of ROSSE.—By the death of this nobleman, Science has been deprived of one of her most illustrious cultivators,—one who, by his marvellous skill and perseverance, constructed a telescope of such power that he was enabled to open out a long vista through the distant heavens, and make observations of celestial bodies, of which mankind had hitherto been entirely ignorant. By means of his gigantic instrument, astronomers have been able to examine those remote nebulous bodies which seem to be in a transitionary state, or as the germs of future planetary systems; and thus we peer into the innermost secrets of Nature, and aid is lent to the sister science of Geology by the light thrown on the subject of the origin of the planet on whose surface we live.

It would be presumptuous on my part to attempt to do justice to the services rendered by Lord Rosse to Astronomy; the more so as they have been admirably expounded by the Rev. Dr. Robinson, the celebrated astronomer, from whose sketch of the career of his lamented friend, in the Obituary of Fellows of the Royal Society, I derive the following details :—

William Parsons, third Earl of Rosse, was born at York on the 17th of June, 1800, of a family which had been settled in Ireland from the time of Elizabeth. He was educated at home by a private tutor, and, when eighteen years old, entered Trinity College, Dublin. Although his career there was eminently successful, he did not graduate, but went to Oxford, where he entered Magdalen College, and, on leaving the University, commenced public life as the representative of King's County in Parliament. His political career was intermitted at the end of eight years, in order that he might devote himself with more freedom to his favourite scientific pursuits, and discharge more completely the duties of a landed proprietor, which he did most conscientiously. But, although kind and considerate as a landlord, he was not the less resolute in supporting the authority of law and putting down the murderous societies which were the terror and curse of that part of Ireland. This, of course, made him a mark for the assassin. He knew his danger; but the knowledge neither made him shrink from his duty, nor embittered his feelings against the misguided people who were conspiring against him. This continued until the time of the famine, which crushed under the weight of real misery the imaginary grievances of the agitators, and showed them who were their real friends. None stood the test better than Lord Rosse, who, during some years, applied nearly all the income of his Irish property to relieve the unhappy sufferers. This told on their hearts, and they thenceforward became proud of his increasing fame, and regarded him as an honour to their nation. He was elected an Irish Representative Peer on the death of his father in 1841; and previously, in 1831, he had been appointed Lord Lieutenant of his county. In 1836 he married Miss Field, a partner worthy of him, who sympathised in his pursuits, and even mastered enough of astronomy to help him in his calculations.

Although most widely known as an astronomer, Lord Rosse was by no means exclusively devoted to this science. In fact, few minds of our day have grasped so wide a range of knowledge. He was skilled to an extraordinary degree in mechanics, and applied his abilities, as is well known, with unusual patience and success to experiments on the casting and polishing of metallic specula for the reflecting telescope. He was a good chemist, and would have attained a high position as a civil engineer, if he had devoted himself to this profession. He was also a master of political economy, and devoted for years much attention to the great question of national education, and the loss of his authority on that subject is deeply felt in Ireland at the present day.

Independently of the great telescope at Parsonstown, constructed by himself, Lord Rosse's chief titles to scientific fame are furnished by the memoirs he contributed to the Royal Society, and which were published in their 'Transactions' for 1840, 1850, and 1861. It would be foreign to my present purpose to detail the processes by which, through many years' well-directed labour, he arrived at the completion of his renowned instrument. Suffice it to say, that his attention was first directed to this subject in 1826, and it was not before 1845 that his efforts were crowned with success, and his mighty telescope so far complete that he was enabled, on the 13th of February in that year, to make, in company with his friend Sir James South, his first observation of the celestial bodies. Since then, however, he continued to improve the instrument for many years.

With all his scientific merit, the Earl of Rosse was also a model man in his social qualities; his conduct being guided by the highest moral principles. Those who, like myself, were attracted to him by old personal friendship when visiting him at his seat in Ireland, and seeing how he enjoyed the companionship of his estimable Countess, and how wisely he instructed his children, could not fail to love him as much for his kindheartedness and simplicity of character, as they admired him for his great acquirements. It is, indeed, a source of the greatest satisfaction to the numerous friends of the late Earl, that he so brought up his sons that his successor has already, by new discoveries in astronomy, given us the assurance that he is a worthy inheritor of the name of his illustrious father.

Intimately dependent as Geographers are upon Astronomers, I reflect with some pride on the fact, that this eminent cultivator of the sister science was so long connected with our Society, having been elected in 1844, on being introduced by myself; and I well know how warm was the interest he took in our prosperity.

Lord Rosse was President of the Royal Society from 1848 to 1854; and in 1862 was elected Chancellor of the University of Dublin.

His appearance promised a long life, but an accident, so trifling that it was neglected till too late, broke down his strength and brought him to his end. A slight sprain of the knee produced, after some months, a tumour, which was ultimately removed by a severe operation. The wound was slowly healing, but he sunk under the process; and, on October 31st last, he died as he had lived, patient and uncomplaining under his long and acute suffering, gentle and considerate to all around him, and strong in Christian hope.

Admiral Lord COLCHESTER.—By the decease of Lord Colchester, our Society has lost one of its most earnest supporters, who, having joined us in 1838, and having during many years assisted us by his advice as member of the Council, was during the years 1846 and 1847 the President of our body.

Lord Colchester was born in 1798, and educated at Westminster School. He entered the navy in 1811, and served successively on board the *Revenge*, Admiral the Hon. A. Legge, in the Mediterranean, the *Bacchante*, Captain Hoste, in the Adriatic, and later, during the hostile operations of the year 1814, on the coast of America. Between these two periods of service he completed the theoretical part of his naval education at the Naval College at Portsmouth. In 1816 he joined the *Alceste*, which conveyed Lord Amherst and his embassy to China. On arriving in that country he occupied a place in Lord Amherst's suite, and accompanied him to the palace of Yuen-men-yuen, near Pekin, since rendered famous by its destruction at the hands of the British troops in the last war, and returned with the Ambassador through the interior of China to Canton. He also drew the sketches contained in the history of this embassy by Sir Henry Ellis. He was further employed in making a plan of the River Yang-tsze-Kiang, and it was this acquaintance with the internal water-communications of this great region which enabled him, as we shall presently see, to render a great service to his country, by a plan which he communicated in 1840 for the invasion of China, and which was eventually adopted with most successful results by the Earl of Ellenborough when Governor-General of India.

Obtaining the rank of Lieutenant in 1817, he again, in 1818, went to sea, on board the *Liffey*, Captain the Hon. H. Duncan, and visited the West Indies, the Baltic, and Mediterranean. On obtaining the rank of Commander he was appointed to the *Racehorse*, and was in the Levant during the Greek war of independence. As Commander of the *Columbine* he was, subsequently, again in the same part of the world. During these cruises he made an examination of the harbours of the Gulf of Kolohythia, and in 1826 received his commission as Post-Captain. After the death of his father and his succession to the Peerage he was appointed to the command of the *Volage*, and proceeded to the South American station, whence he made a voyage to Europe to convey the Emperor and Empress of Brazil to Cherbourg. On the completion of this duty he returned to his station and visited both the eastern and western coasts of South America, making an inland journey to Arequipa when off the coast of Peru. Subsequently, during the Belgian revolution, the *Volage* was despatched to the North Sea, and, on the surrender of the citadel of Antwerp, recalled home. With this closed Lord Colchester's active service; for, having afterwards devoted himself to Parliamentary duties, he never again held a command afloat, and became in course of time an Admiral on the reserved list.

In his parliamentary career Lord Colchester consistently adhered to the Conservative interest, and spoke occasionally, from his first session in 1833, both on naval and general topics. On the approach of the Chinese war in 1839 he drew up a plan, which he had long previously conceived, for intercepting the interior communications of the empire by sending a fleet up the Yang-tsze-Kiang. He consulted on this subject the veteran Chinese scholar Sir George Staunton, who strongly approved of it, and it was placed in the hands of Lord Palmerston, the Foreign Minister at that period; but nothing beyond a preliminary survey of the mouth of the river was then undertaken, and it was reserved for the new ministry, after the change of government in 1841, to profit by the suggestion. Lord Colchester's map of the Yang-tsze-Kiang, relating to the course of the river between the entrance of the Great Canal and Nankin, was engraved by the Admiralty, and when Lord Ellenborough was appointed Governor-General of India he sent reinforcements in March, 1842, to Sir Hugh Gough and Sir W. Parker, with orders at once to proceed to action on the Yang-tsze. The capture of Tching-Kiang-Foo, at the junction of the canal with the great river, closed the struggle, and Lord Colchester's claim to have aided in winning this triumph for his country was fully recognised by the Governor-General, who carried his suggestions into execution.

On the formation of Lord Derby's first administration, in 1852, Lord Colchester was appointed to the united offices of Paymaster-General and Vice-President of the Board of Trade. In 1853 he received the honorary degree of D.C.L. from the University of Oxford, and in 1858, Lord Derby being again Prime Minister, he was appointed to the office of Postmaster-General. He discharged the duties of that office with great industry; but, unhappily, at this time his general health underwent a deterioration, of which the principal symptom was a swelling of the leg, from which he never completely recovered. He continued, however, to attend the House and exert himself in behalf of the various charitable institutions with which he was connected as Chairman, until 1866, when his health was further undermined, and from February, 1867, to his death, which took place on the 18th of October last, he was almost entirely confined to his bed.

Lord Colchester married in 1836 Elizabeth Susan, second daughter of the first Lord Ellenborough, by whom he had an only son, the present Lord, who as one of our young associates is, I trust, destined to fill the post so worthily occupied by his excellent parent, whose modest and retiring manners, accomplishments and good sense, accompanied as these qualities were by the truest kindness and the highest sense of honour, endeared him to every one who knew him.

The Right Hon. Sir George CLERK.—By the death of this useful and highly-respected man, in his eighty-first year, I have lost a friend with whom I began life fifty-two years ago, and whose many good qualities I have never ceased to esteem during that long period.

For many years he was the representative in Parliament of his native county of Edinburgh, and he would doubtlessly have continued to enjoy that honour to the day of his death, had not the Reform Bill of 1832 entirely broken up the old social system on which Scotch society had been based for centuries. That Bill, which was a salutary reform in England, produced a complete revolution in Scotland, where up to that day landed proprietors only who were possessed of a certain rental returned the county member, who was thus chosen as the true representative of their broad acres. Such has been the change resulting from this Act, that the landed proprietors have to a very great extent lost their legitimate influence. But whilst Sir George was ever a Conservative in politics and occupied several public offices of mark, he steadily supported Sir Robert Peel when that great statesman felt it to be his duty to abrogate the Corn Laws.

Among the public offices he filled, Sir G. Clerk had been Secretary of the Treasury, Vice-President of the Board of Trade, Master of the Mint, and for many years the so-called "Whip" of the old Tory party in Parliament.

Sir George Clerk was a true lover and patron of the Fine Arts, and was noted through life as a warm supporter of the Academy of Music and all good musical meetings, as well as the supporter of many a promising proficient in the art.

He was also much attached to our Science of Geography and its Natural History applications, having been a Fellow of our body since our foundation, and having acted during the last six years of his well-spent career as President of the Zoological Society.

He married Miss Maria Law in 1810, and this very estimable lady, who bore him twelve children, predeceased him only by one year. He is succeeded by his eldest son, now Sir James Clerk.

Captain James MANGLES, R.N.—As one of the scientific officers of the Navy, Captain Mangles well deserves to be favourably noticed on this occasion, particularly from the interest he had always taken, during a long life, in the advancement of geographical science. He entered the Navy so long ago as the year 1800, and for several years saw much active service in various parts of the world, on board the *Narcissus*, 32 guns, under Captain Ross Donnelly. Subsequently, as Lieutenant of the *Penelope*, he aided in the reduction of Martinique in February, 1809, and bore his share generally in the naval enterprises of those stirring times until 1815, when, having attained the rank of Commander, he retired on half-pay.

I formed an acquaintance with Captain Mangles as early as the year 1816, when he was travelling in Italy on his way to the East with his companion and brother officer, the Hon. C. L. Irby. The results of their tour were published under the title of 'Travels in Egypt, Nubia, Syria, and Asia Minor,'—a work that soon attained a wide popularity. Since then he devoted a great portion of his time to the study of Geography and Hydrography, and published at intervals several treatises, which evince his zeal in the study of these sciences: such were his 'Geography, Descriptive, Delineative, and in Detail,' his 'Illustrated Geography and Hydrography,' and others. He was elected Fellow of the Royal Society in 1825, and was one of the earliest Members of our own body, having been enrolled in 1830. His death took place on the 18th of November last.

Mr. Ashurst MAJENDIE.—One of our original members, Mr. Ashurst Majendie, the proprietor of Castle Hedingham, in Essex, was a man of considerable knowledge and of a very inquiring mind. To geographers he was chiefly known as the brother-in-law of Lady Franklin, and for the lively interest which he took in advocating, with myself and others, the search after the great Arctic hero.

Mr. John Minet LAURIE, of Maxwelton House, Glencairn, was

known as a profound historian. He formerly sat in Parliament for Dover, and for Maidstone. He was elected a Fellow of the Royal Geographical Society in 1861, and died on the 25th of February, 1868, in the fifty-sixth year of his age.

Rev. Pierce **BUTLER**.—By the death of the Rev. Pierce Butler, rector of Ulcombe, Kent, we have lost, in the prime of life, an associate who was a true Geographer at heart, and an experienced traveller, and who, for some months prior to his death, devoted a large share of his time and energies to a project for a survey of the peninsula of Sinai, with a view to extending our knowledge of Biblical geography.

Mr. Butler was born in 1826, and was the third son of Lieutenant-General the Honourable Henry Edward Butler, and grandson of the third Earl of Carrick. He graduated at Trinity College, Cambridge, in 1848, and soon afterwards took holy orders. At the close of 1853, his eldest brother, Captain H. I. Butler, of the 55th Regiment, an officer of great ability and promise, received special leave of absence from Government for the purpose of exploring a portion of the peninsula of Sinai, and, attracted by this opportunity of visiting, in his brother's company, a country in which from boyhood he had ever felt the deepest interest, Mr. Butler resolved to go with him. Their preliminary researches led them to the conclusion that a careful survey and systematic examination were essential to the solution of the many interesting problems of the peninsula. This task had scarcely been commenced when news reached them of the outbreak of the war with Russia; and Captain Butler, obeying the call of duty, relinquished his interesting work, and sailed eastward from Alexandria in April, 1854, to join the expeditionary army. Mr. Butler, after visiting the Holy Land and Constantinople, returned, at the end of May, to England; but the soldier-brother was destined never to follow him, for, ere the year was out, his friends at home received the sad intelligence that he had fallen on the battle-field of Inkerman, whilst serving on the Staff of the First Division of the army. On the 21st of the preceding June, another gallant brother, Captain James Armar Butler, the intrepid "hero of Silistria," had died of wounds received during that memorable siege —struck down in the height of a career so brave and so distinguished that the sorrow his father and friends felt at his death was shared, as Lord Hardinge feelingly expressed it, "by the country, the army, and the Sovereign."

Two noble brothers had thus fallen in their country's cause within

the short space of five months; and now, Pierce Butler himself, animated by that chivalrous spirit which was one of the finest traits of his character, determined to go out at once to Turkey, for the special purpose, amongst others, of volunteering his ministrations to the sick and wounded soldiers of our army, in whatever sphere they might be most acceptable: he felt, indeed, that some such useful Christian service was the most fitting tribute he could offer to the memory of his lamented brothers. He accordingly proceeded to Constantinople in December, 1854, and shortly afterwards accepted the offer of an appointment as one of the chaplains to our army in the East. In discharging this voluntary duty his gentle, genial manners and amiable disposition won the hearts of officers and men; and those now living who were present with the Second Division in the camp before Sevastopol, must retain a clear and grateful recollection of his ministrations.

At the close of the Crimean war Mr. Butler resigned his appointment as chaplain, and for the next five years was a constant traveller in America and in many parts of Europe. In 1861, he was presented to the rectory of Ulcombe, near Staplehurst, a living in the patronage of his family, which he held until his death; and in the same year he married. In the retirement of a country life, the interest which his visit to the Desert of Sinai in 1854 had created was ever prominently before him, and to carry out, if possible, the work of survey and exploration in that region, which his gallant brother had been so reluctantly compelled to relinquish, was the one object which, of all others, he was most desirous to effect. Encouraged by the assistance which Government had afforded towards the recent survey of Jerusalem, he determined last year to endeavour to obtain, from amongst his own relatives and friends, and other persons likely to take an interest in Biblical and geographical research, sufficient funds for a topographical survey of at least the most interesting portions of the peninsula of Sinai; and, if successful in this, to solicit the aid of Government in its execution. In a few weeks he had obtained so many liberal promises of support from noblemen and gentlemen interested in the subject as to justify him in laying his plan before the Secretary of State for War. Sir John Pakington readily lent his aid, and at once authorised Sir Henry James to undertake the superintendence of the Sinai survey, as he had formerly done of the survey of Jerusalem, and to equip and send out an

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been surpassed. In a word, no man of my time was ever more generally respected and beloved.

He was born in the year 1784, and dying on the 12th February of this year, he was then consequently in his eighty-fourth year.

In 1810 he married Lady Charlotte Strangways, youngest daughter of the second Earl of Ilchester, by whom he had one son only. The fond parents having a presentiment that their boy might meet with his death on the water, selected Harrow School as the place of his education, because there was not, as at Eton and other places, a river near it. Yet, to their intense grief, the youth was there drowned in a pond! and the shock was so great that the affectionate mother never recovered from it.

Sir Charles Lemon was for many years the representative in Parliament of his native county, Cornwall, and was ever a consistent supporter of the old Whig principles. As a magistrate and country gentleman he seized every opportunity of promoting works of usefulness and charity, and at his hospitable mansion of Carclew his fine social qualities were heartily appreciated by all those who, like myself, have passed enjoyable and pleasant days there.

Sir Charles Lemon was much attached to Science, particularly to those branches of it which related to or improved the mining operations of his own county. In the year 1846, being President of the Royal Geological Society of Cornwall, he invited me, his guest, to attend an anniversary meeting of that body and say something which might give encouragement to the tin-miners, who were at the time in a suffering state, and many of them out of work. It was then, referring to what I had been speculating upon in our own Society and at other places in the two previous years, as to the auriferous character of the Australian rocks, when compared with those of the Ural Mountains, that I ventured to counsel these tin-miners to emigrate to Australia and dig for gold. Some of them took my advice, and in 1848 I was in possession of small specimens of gold ore sent home by them. Thereon I took more courage and warned Her Majesty's Government of the great event which was about to be fulfilled. I will only add that the so miscalled *discovery* of gold, *i. e.* the diggings on a profitable scale, were not opened out till 1851, and that my much earlier letter to the Colonial Secretary is printed in the Blue Book on Gold.

Sir Charles Lemon was elected into our Society in 1836; he was also a Fellow of the Royal and Geological Societies, and the Presidents of these bodies will, I am sure, be as ready as myself to testify to the high worth of so excellent and accomplished a man, and such a choice specimen of a thorough English gentleman.

Mr. John **CRAWFURD**, F.R.S.—By the recent death of this enlightened and excellent man, on the 11th instant, I was plunged into a profound sorrow—a sorrow shared, I am sure, by everyone who knew him, and particularly by the Fellows of the Royal Geographical and Ethnological Societies, as well as the members of the Athenæum Club.

Born in the island of Islay, in 1783, he was in his 85th year when he was most unexpectedly carried off by an attack of inflammation of the lungs. For, although he had reached a ripe old age, he had preserved his habitual sound health, and had applied to the last the full vigour of his strong mind in so genial a manner, that he occupied a position among us which was unrivalled, and makes us all deeply sensible of the sad loss we have sustained.

To attempt to do justice in this short notice to the various merits of John Crawfurd—whether as a great traveller, an accomplished Oriental scholar, an able administrator, a sound geographer and ethnologist, and an accurate statist—is wholly beyond my power. Few men, indeed, of this century have passed away whose deeds more imperatively call for a faithful and full biography. Earnestly hoping that such a work may be undertaken by some competent person among his numerous friends and admirers, I can only briefly advert to some salient points of character in the long, distinguished, and useful career of my lamented friend.

Having studied medicine for three years at Edinburgh, he went to India in 1803, as an Assistant Surgeon in the Company's military service, and was almost immediately immersed in active duties. Thus, he served under Lord Lake, when that General invaded the dominions of Scindia, and was also present at the siege of Delhi. In the following year he accompanied Colonel Monson's force in the advance to Ougain and in its retreat before Holkar's army; and we have still happily among us a fresh and vigorous veteran Indian soldier—Colonel Sykes—who informs me that in February, 1805, he knew Crawfurd when he was in medical charge of twelve companies of Sepoys in the beleaguered fortress of Rampoora.

After five years of service in the North-western Provinces of India, he was transferred to Penang, where he commenced those studies of the Malay languages and people which enabled him eventually to compose that remarkable work the 'Malay Grammar and Dictionary.' In 1811 he was selected by Lord Minto to accompany him in the great expedition which led to the conquest of Java. There, as a diplomatist, he represented the British Government for nearly six years, during which he made extensive journeys and voyages, and amassed those diversified materials in Ethnology, Natural History, and Geography, which, after his first return to England in 1817, he published in 1820 under the title of 'History of the Indian Archipelago.'

Going back to India in 1821, he was appointed by the then Governor-General, the Marquis of Hastings, to the diplomatic mission sent to Siam and Cochin China; and on this occasion he obtained the highest credit from the Indian Government. It may be affirmed, indeed, that during his Indian services all leading public men sought for his counsel and advice; and I might enumerate the names of a host of eminent authorities, including Colebroke, Mountstuart Elphinstone, and many others, who were his intimate friends and correspondents.

From 1823 to 1826, acting as Governor of Singapore, after the retirement of Sir Stamford Raffles, he became the second founder and wise administrator of that colony, which, through his sagacious arrangements with the neighbouring chiefs, was raised into the highly important position it has ever since maintained.

In addition to the highly valuable commercial and other statistics registered by our deceased Fellow, in relation to which his name stands out in gazetteers throughout the world, he never neglected any branch of natural knowledge. Thus it was that, in his voyage up the Irrawady to the capital of Ava, in 1826, he collected those fossil bones of Mastodon, large Tortoises, and Crocodilia, &c., which were described by Dr. Buckland and Mr. Clift, and which gave to the former the opportunity of generalising on the important fact, that there existed in the Indian regions formations analogous to the tertiary and superficial deposits of Europe.* It was when these remarkable collections were the admiration of geologists, that I became better acquainted with Mr. Crawfurd; and from that day, now forty-two years ago, our intimacy strengthened with each succeeding year.

For some time, indeed, after his return from India, he was more immersed in political affairs than harmonised with my own special

known as a profound historian. He formerly sat in Parliament for Dover, and for Maidstone. He was elected a Fellow of the Royal Geographical Society in 1861, and died on the 25th of February, 1868, in the fifty-sixth year of his age.

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* See 'Transactions of the Geological Society,' second series, vol. ii. p. 377.

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favourite science. The mere enumeration of the titles of these memoirs, as given in the appended footnote—all produced in seven or eight years—is a wonderful proof of the capacity, versatile power, and energy of an author who could bring out all these works between his seventy-eighth and eighty-fifth year.* Including his frequent contributions to reviews and weekly newspapers, particularly the 'Examiner,' Mr. Crawfurd has perhaps written more than it has been given to any one author of this century to accomplish. I may here also observe, as a striking illustration of the logical accuracy of his thoughts and the strength of his memory, that his writings on the statistics of commerce, geography, philology and ethnology scarcely ever required a correction of his pen; for they exhibit fewer erasures and alterations than are to be seen in the original manuscripts of Walter Scott, or any other author, even of works of fiction.

Personally I have to acknowledge with gratitude the contributions he made to several of my Anniversary Addresses, whenever it fell to me to allude to India or its great Archipelago, and on this very occasion I am indebted to him for the article on Burmah.

Yet, with all this incessant literary labour, he found time to read extensively, and store up in his surprising memory all the knowledge that he had ever acquired. He also found leisure to hold much social converse with many friends, both young and old; and few of the members of the Athenæum Club will now enter its great vestibule, in which he was generally to be seen in the afternoon, without mournfully regretting the absence of the cheerful countenance and friendly grasp of the hand of dear John Crawfurd.

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* Out of the thirty-eight memoirs contributed by Mr. Crawfurd to the 'Journal of the Ethnological Society,' I may mention the following:—'On the Connexion between Ethnology and Physical Geography;' 'On Numerals as Evidences of the Progress of Civilisation;' 'On the Antiquity of Man from the Evidence of Language;' 'On the Commixture of the Races of Man as affecting the Progress of Civilisation;' 'On Colour as the test of the Races of Man;' 'On the Relation of the Domesticated Animals to Civilisation;' 'On Language as a test of the Races of Man;' 'On Lyell's Antiquity of Man,' and 'Huxley's Evidence on Man's Place in Nature;' 'On the Sources of Tin for Bronze Tools and Weapons of Antiquity;' 'On the supposed Infecundity of Human Hybrids or Crosses;' 'On the supposed Stone, Bronze, and Iron Ages of Society;' 'On the so-called Celtic Languages in reference to the question of Races;' 'On Cannibalism in relation to Ethnology;' 'On the Physical and Mental Characteristics of the Negro;' 'On the Origin and History of Written Language;' 'On the Ancient Hindu Sacrificial Bell found in the Northern Island of New Zealand;' 'On the Invention of Writing Materials in reference to Ethnology;' 'On the Migration of Cultivated Plants in reference to Ethnology;' 'On Cæsar's Account of Britain and its Inhabitants;' 'On the History and Migration of Cultivated Plants;' 'On the Dissemination of the Arabian Race and Language;' 'On the Migration and Cultivation of Sacchariferous Plants;' 'On the Plurality of the Races of Man;' 'On the Animal and Vegetable Food of the Nations of Australia in reference to their Social Position;' 'On the Classification of the Races of Man according to the form of the Skull;' 'On the History and Migration of Cultivated Plants and on Condiments;' 'On the Antiquity of Man' (second memoir); 'On the Ethnology of Abyssinia and adjacent Countries,' read Nov. 12, 1867. Since the contribution of the last of these memoirs to the volumes of the Ethnological Society, Mr. Crawfurd has read certain others, including one on his objections to the Darwinian theory, another on coffee and other plants, and has left sixteen other manuscript papers behind him,

Let me add that he was equally popular with the gentler sex, who could not fail to be attracted to him by his genial address and his happy and simple manner of conveying information. Well has it been said by an able writer in the 'Times'* who commemorated his deeds, that "all the members of the Geographical and Ethnological Societies will miss the tall form of the evergreen veteran, who scarcely ever failed to take part in their discussions, and who, while stoutly maintaining his own views, showed a forbearance and courtesy which might well be imitated by all members of learned Societies."

So deeply were his feelings and sympathies bound up with our meetings, which he so often enlivened by his good humoured criticisms and wise cautions, that during his last and fatal illness, when his mind was wandering, he was frequently speaking volubly as if he were addressing our Society, with kind allusions to his associates.

As a Highlander, I am proud that Islay should have produced such a man as John Crawfurd; and when his remains were consigned to the grave on Monday last, it was a solace to my heart to see many true friends assembled to pay this last mark of respect to such a noble type of humanity.

Mr. Crawfurd was first married to Miss Robertson, who, losing her health in India, was coming home with her child when the ship was lost and all hands perished. He married secondly in 1820 the beautiful Miss Horatia Perry, daughter of Mr. James Perry. She died in 1855, leaving him one son, Oswald, now H. M. accomplished Consul at Oporto, and two daughters, Mrs. Mynors and Mrs. George Ramsay, to deplore the loss of the most affectionate of fathers.

In addition to the men who have passed away, and of whom I have treated as being distinguished in science and art or in the public service, are the following deceased Fellows:—

Mr. T. H. Alsager; Mr. Arthur Anderdon; Lieutenant J. B. Bewsher; Mr. Thomas Bigg; Mr. J. W. Church; Captain Creswell, R.N.; Mr. John J. Cowell; Mr. William Thomas Hodgetts Chambers; Dr. James French; Mr. Charles Fraser; Mr. J. L. Franklin; Mr. Nathaniel Gould; Mr. W. S. Harvey; Mr. Robinson Hudson; Mr. Andrew Henderson; Mr. John Jerdein; Mr. Charles Kean, the celebrated actor; Mr. A. O. Lloyd; Colonel Thomas McGoun; Mr. Colin J. Mackenzie; Mr. H. H. Morris; Captain Rochfort Maguire, R.N.; Mr. Duncan Macpherson; Sir Richard D. Neave, Bart.; Mr. James Price, M.D., &c.; Mr. William Reed; Mr. James Smith; Mr. R. S. Sutherland, R.N.; Mr. John Scott; Mr. William Scott; Mr. William Silver; Mr. Arthur Vardon; Mr. J. E. Worcester.

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* See 'Times,' May 13, 1868.

ADMIRALTY SURVEYS.*—The Hydrographical Surveys of the Admiralty on the Coasts of the United Kingdom, in the Colonies, and in Foreign waters, have progressed during the past year favourably and successfully; and the Naval Officers employed in carrying them out have displayed their accustomed industry and ability, as will be seen by the following brief sketch of the result

West Coast of England.—H.M.S. *Lightning*, under Captain E. J. Bedford, with three assistants, has been employed in a re-survey of the upper portion of the Bristol Channel, from the termination of the Cardiff Survey of 1866-7 to the upper limit of King Roads, where many changes were found to have taken place in the bank-edges and shoals—so much so, as to require a re-buoyage on the part of the Trinity Corporation. This survey having been completed, the *Lightning* has been laid up, and the force on the home coasts reduced for the present to one regular surveying-vessel.

East Coast of England.—Staff-Commander E. K. Calver, with two assistants, in the *Porcupine*, have continued their examination of last year on the Eastern Coast with a view to the correction and revision of the Charts and Sailing Directions. The Coast and Harbours from the River Humber to the North Foreland have now been minutely examined. The entrance of Harwich Harbour, where improvements have been carried out to increase the depth, has been re-surveyed, and a new survey has been executed of the Suffolk Coast from a little below Lowestoft to Orfordness. During the progress of this latter work a discovery, interesting from its apparent connexion with the Suffolk beaches, has been made, viz., the existence of a tract of nine square miles of shingle a short distance in the offing between Dunwich and Sizewell, being of the same character as that of the beach, opaque flint, though more angular from having been subjected to less attrition: this feature may be of interest to those who have made the origin and movement of sea-beaches the subject of their investigations.

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* Communicated by Captain Richards, R.N., F.R.S.

Portsmouth.—Staff-Commander D. Hall, with a steam-launch and a small party consisting of a boat's crew, has been employed in the examination of the bar and shoals at the entrance of this important harbour. The entrance as far as Spithead, and westward beyond Stokes Bay, has been very closely and carefully sounded on a scale of 24 inches to the mile; and a re-survey of the harbour itself on a scale of 30 inches to the mile has been commenced, which had become absolutely necessary in connexion with the extensive Government works being carried out, and the dredging away of the banks in contemplation.

Channel Islands.—Staff-Commander John Richards, with one assistant, and with such means as the vessels employed in the fishery and pilotage establishments are able to afford, is still employed in completing this intricate and very necessary survey. During the past year they have surveyed the Ecrehos and Drouilles rocks and islets, together with the Ecrevière Bank, all of which form a continuous chain of dangers, 10 miles in length by 3 miles in width, lying nearly midway between Jersey and Cape Carteret, and which are necessarily included in the Admiralty Chart of Jersey, now in course of publication, on a scale of 4 inches to the mile.

The spacious channel between this extensive line of reef and the island of Jersey has also been closely sounded, and many hidden dangers, hitherto unknown, have been discovered and placed on the Chart.

FOREIGN SURVEYS.—*Mediterranean.*—Captain P. F. Shortland, with an able staff of assistants, in H.M.S. *Hydra*, was employed in the early part of the last season in surveying the southern and eastern shores of Sicily, carrying the soundings off to depths of 2000 fathoms. Later in the year they were employed in sounding the Malta Channel; and in September, in consequence of an imperative necessity for a knowledge of the depths between Bombay and the Red Sea—in connexion with a Submarine Telegraph to India—the *Hydra* was detached from the Mediterranean for this purpose. She left Gibraltar in October, amply provided with all the necessary material, passed round the Cape of Good Hope, and reached Bombay in January; and, by the month of March, Captain Shortland having been greatly favoured by weather, most ably and successfully completed this important service, having obtained positive depths, and brought up specimens of the bottom at short intervals in a direct line from Bombay to the Kooria Mooria Isles, and thence to Aden.

The *Hydra* is now making a few additional investigations of the bottom in the Indian Ocean, and settling some doubtful positions *en route* to England, after five years' foreign service, and will be replaced in the Mediterranean by the *Newport*, a small screw surveying-vessel, fitting out under Commander G. S. Nares.

Strait of Magellan.—H.M.S. *Nassau*, Captain R. C. Mayne, C.B., with several experienced assistants, has been employed in examining the approach to this strait, and its eastern portion, including the First and Second Narrows as far as Cape Negro. Great progress has been made in this work under considerable difficulties of climate and almost constant gales of wind, rendering it a harassing and often hazardous service for boat-parties. The great changes, however, which have been found to have taken place since surveys of nearly forty years ago—and the necessity of meeting the increased requirements of navigation, by this route to the Pacific, for large steam and iron-clad ships—are conclusive evidences of the usefulness of this undertaking. Among other changes the Sarmiento Bank, extending several miles off Cape Virgin, has undergone a material alteration in its character; and a pinnacle rock, with only 3 feet of water on it, and which had been undetected in former surveys, has been discovered at a distance of two miles from the cape.

China Sea.—Staff-Commander J. W. Reed, in command of the *Rifleman*, and a not over-strong staff of assistants, have been indefatigable in their labours among the reefs in the China Sea during the past season. No less than nine dangerous and extensive coral-reefs in the main route have been carefully examined, and added to the Chart immediately on their arrival at the Admiralty, as also the Sea-Horse Bank at the north-western end of the Palawan Passage.

The position of the doubtful "Holme's Shoal," in the fairway of that passage, has likewise been examined and found free from danger. A close and complete survey of Rhio Strait has been executed, and so far extended to the south as to include the islands of the Linga Archipelago, and the various channels leading to the Strait of Durian, as far south as the Island of Missana. The South Channel into Penang, which had undergone considerable change, has also been resurveyed.

North China and Japan.—Commander E. W. Brooker, in H.M.S. *Sylvia*, with a full staff of assistants, has during the past year been chiefly employed on the coasts of Formosa, of which, until now, our surveys have been of a fragmentary and imperfect character.

The *Sylvia*, in addition to the survey of the coasts and ports of Formosa, has searched for, and pronounced not to exist, Harp Island

and Alceste Rock on its southern and eastern sides, and has settled the position of Botel, Tobago Island, not hitherto correctly placed in regard to Formosa.

On the voyage to China, Commander Brooker visited the Andaman Islands and Cocos Group, for the purpose of rectifying the geographical positions of certain points reported to be considerably in error, and which he accomplished. He then carried a line of soundings along the Coast of Martaban, through the Strait of Malacca, and up the China Sea, from Saigon to Hong Kong, with a view to the requirements of submarine telegraphy between Singapore and China.

The *Sylvia* has also visited the Pratas Reef, as a preliminary step towards the lighting, by the Chinese Government, of that important position which has proved so fatal a danger to the navigation of the China Sea.

A valuable report on the lighting of the Coast of China between Hong Kong and Shanghai has also been furnished by Commander Brooker, and there is reason to believe that the Chinese Government, with the able professional aid of its English agents and advisers, are about to take up this important matter in earnest.

The Serpent, Commander C. Bullock, has been usefully employed on the coast of Japan, examining the anchorages on the east and west coasts of Nipon, with a view to the selection of treaty ports. Commander Bullock has surveyed the ports of Hiogo and Oösaka in the Inland Sea, and Nanao Harbour on the west coast, and examined the entrance to Kagosima Gulf and the coast about Cape Chichakoff; and has been generally engaged in correcting errors, getting soundings, and adding to our as yet partial knowledge of the coasts of that extensive country.

West Indies.—Staff-Commander John Parsons, with two assistants, is carrying on the survey of the British West India Isles by means of small vessels or boats hired on the spot. Owing to the inexpensive system pursued, the work necessarily progresses somewhat slowly; but in no part of the world has more elaborate or more accurate and perfect work been performed than in this survey.

A very complete Chart of the Island of Montserrat, closely sounded to the edge of the steep land which forms its base, has lately been received from Staff-Commander Parsons; and an equally careful survey of the Island of Barbadoes has been now commenced. Some interruption to the survey has lately occurred, in order to make an examination of the various channels among the Virgin

Islands to ascertain whether any serious changes had resulted from the late earthquake disturbances, which appears from the report of Staff-Commander Parsons, and other naval officers on the station, not to have been the case.

The surveys necessary to arrive at a conclusion respecting the selection of a station for the West India Mail Service, in lieu of St. Thomas, have also engaged the attention of our naval surveyors; and up to the present moment they are still occupied on this service.

It must not be omitted to mention that much valuable hydrographical information has been received from naval officers generally, both on this and other stations during the past year.

To Captain R. V. Hamilton, of H.M.S. *Sphinx*, especially, we are indebted for a close examination of the channel between the Island of Santa Cruz and the Virgin Group subsequent to the late earthquakes in that neighbourhood; upon which occasion he obtained a series of deep soundings, which were very valuable, and furnished as well an interesting paper on the subject generally.

Commander Charles Parry, of H.M.S. *Cordelia*, has also succeeded in obtaining deep soundings between Jamaica and Cuba. Information of this nature is always valuable, and especially at the present time, when it is likely to be turned to practical account by the connexion of Florida with the Southern Continent of America by means of the Telegraph Cable.

The Gannet, Commander W. Chimmo, in addition to her duties as a ship of war on the West India Station, has been principally occupied during the past season in continuing the survey of the Island of Trinidad and adjacent mainland, which important work will have been completed in a very perfect way by the middle of the present year. During the summer and autumn of 1867, the *Gannet* visited and explored a considerable stretch of the Labrador Coast, in the interest of the Fisheries; the limits of this coast, hitherto very inaccurately laid down, were correctly determined, and several harbours and anchorages carefully surveyed, to the great advantage of the seafaring population of Newfoundland, who annually resort to the fishing-grounds of Labrador.

Newfoundland.—Staff-Commander J. H. Kerr, with two assistants and a hired vessel, is steadily progressing with the coast survey of this colony.

During the summer of 1867 these officers rendered great assistance in procuring soundings and tracing out the best course for the submarine cable between Placentia Bay at the south end of Newfoundland, and Cape Breton, in Nova Scotia; as also in ascertaining the position and assisting in the recovery of the Atlantic Cable eastward of Newfoundland. Subsequently the survey of the coast of Concepcion Bay and the examination of the dangerous rocky ground in the vicinity of Cape Freels and the off-lying islands was proceeded with.

Bermudas.—The examination, which was undertaken principally with the view of discovering the exact capabilities of the numerous narrow openings through the reefs of this group, and ascertaining the depth of water over the reefs generally, has been completed, and the survey discontinued.

British Columbia.—Mr. Pender, Navigating Lieutenant, and two assistants, have been employed in continuing the survey of the inner ship-channels between Vancouver Island and the northern boundary of British North-West America near Fort Simpson. This work, which is essential to the safe navigation of a very intricate region, has progressed very satisfactorily, and, when completed, will be of great benefit to our ships of war and to the future commerce of these colonies.

Cape of Good Hope.—This survey, which is being carried on principally by shore parties, aided by a ship of war when one can be spared by the officer commanding the station, is under the charge of Mr. W. E. Archdeacon, Navigating Lieutenant, and is now completed as far eastward as the Kei River, after long and laborious operations extending over many years. The whole of the coast from the Cape of Good Hope almost to the Kei River, a distance of 500 miles, is now published for the use of the seaman on a fair navigating scale, together with plans of every anchorage which is available between Simon's Bay and Natal.

AUSTRALIA.—*Victoria.*—The coast of this colony has been surveyed for some distance west of Cape Otway, with many additional soundings obtained off Ports Phillip and Western, and the survey is now being continued eastward between the latter port and Wilson Promontory. There has been some unavoidable delay in its progress, owing to the illness of Commander Wilkinson, which terminated in the death of that lamented officer in December last; by which sad event the navy has lost a most able and zealous officer, and the surveying branch of it one whose whole professional life had been conscientiously spent in its service.

New South Wales.—Captain Sidney and his assistants have made their customary good progress with the survey of the shores of this colony. The coast-line between Sydney and Ulladulla, a distance of 112 miles, has been completed, together with the re-surveying of a great part of Broken Bay, and a plan of Jervis Bay, 80 miles southward of Sydney.

South Australia.—Commander Hutchinson and his two assistants have been employed during the past season on the coasts of Yorke Peninsula, which separates the Gulfs of St. Vincent and Spencer, and which, with the surveys of the anchorages of Ports Adelaide and Glenelg, makes up an amount of coast-line equal to about 160 miles.

Queensland.—Mr. Bedwell and his assistant have completed an entire re-survey of Moreton Bay, which was much required; and they have likewise completed the outer coast from Cape Moreton to Point Danger,—thus connecting the shores of the two colonies of Queensland and New South Wales.

Red Sea.—Consequent on the Abyssinian expedition, additions have been made to our knowledge of the coasts and reefs of the Red Sea between Aden and Annesley Bay; for, although no specially fitted surveying-vessel was available for this service, it has been ably performed by Captain D. Bradshaw, of H.M.S. *Star*, who was selected for the duty from his special qualifications.

The results of the labours of the Hydrographical Department during the past year have consisted in the engraving and publication of 56 new charts, and the revision of a vast number of original ones, and about 164,000 have been printed for the use of the naval service and the public.

Sailing Directions for the west coast of Scotland, coasts of France, Spain, and Portugal, 2 volumes of the 'China Sea Directory, Newfoundland, Labrador, the North Sea, and Australia,' have been published, as well as the Annual Tables of Tides, Lights, &c.

NEW PUBLICATIONS.—The *Society's* '*Journal*,' vol. 37.—I have again to congratulate the Society on the punctual issue of the annual volume of our 'Journal' before the period of the anniversary, an admirable improvement on all antecedent practice, which is due exclusively to the zealous and untiring labours of our able Assistant-Secretary, Mr. H. W. Bates. The principal subjects contained in the present volume are:—Mr. Johnson's 'Report of his adventurous Journey across the Himalaya and the Kuen-lun to Khotan;' Dr. Mann 'On the Physical Geography and Climate of Natal,'—a truly philosophical treatise on the subject, and founded on original observations; Colonel Tremenheere 'On the Physical Geography of the Lower Indus;' Professor Raimondi 'On a Portion of the Province of Carabaya in Southern Peru,'—an important contribution to the geography of this interesting region; Admiral Boutakoff's Memoir 'On the Delta and Mouths of the Amu Daria;' Lieutenant Bewsher 'On the Results of his Survey of a Portion of Mesopotamia, South and West of Baghdad;' Mr. Findlay 'On the last Journey of Dr. Livingstone,'—an able exposition of the geography of Central Africa, according to our present information, tending to show that Lake Tanganyika may be the ultimate source of the Nile; 'Notes on Eastern Persia and Western Beluchistan,' by Colonel Goldsmid; Kennedy's 'Report on an Expedition into Laos and Cambodia in 1866;' Dr. Haast's 'Altitude Sections across the New Zealand Alps of Canterbury Province;' and, lastly, Captain Godwin-Austen 'On the Pangong Lake District of Ladakh.' With the exception of the last-named, all these memoirs are accompanied by maps, mostly founded on original material supplied by the respective authors. On the geographical value of these memoirs it is needless for me further to dilate, especially as most of them have been read and discussed at our evening meetings, copious reports of which are published in our 'Proceedings;' but I may point out the large proportion which papers on physical geography, in this as in previous volumes, bear to those of mere description, as showing the importance we attach to the purely scientific aspects of our pursuit.

With regard to the numerous works published in various countries on subjects relating to geography, it is not my purpose, as I have stated in previous years, to pass them all in review in my annual addresses. According to established custom, I limit myself to a short notice of such as have fallen under my attention. Those who desire full information on current geographical literature will do well to consult that indispensible periodical, Petermann's 'Geographische Mittheilungen,' in which, from time to time, an article appears enumerating every work which has any bearing on geography, and arranged in classified order, according to countries.

Major's Life of Prince Henry.—I had occasion in my last year's Address to draw the attention of the Society to a remarkable work elucidating the comparative geography of Asia, by our associate Colonel Henry Yule, entitled, 'Cathay, and the Way Thither,' by which our acquaintance with the amount of knowledge of Eastern geography possessed by our ancestors was vastly increased. I have this year to speak of another work of a similar character, which has recently been produced by our secretary, Mr. R. H. Major, in which a large number of entirely new points in the history of geographical discovery have been successfully established. It is impossible to open this book, which bears the title of 'The Life of Prince Henry of Portugal, surnamed the Navigator, and its Results,' without observing how great an amount of labour and patient research has been devoted to its preparation. Till comparatively recently the materials for such a work were not to be found in England; but, by the careful study of authentic contemporary documents, Mr. Major has brought into prominent relief the name and life of one till now too little known, but to whom, in fact, was due the discovery, within one century, of half the world. And it is in this aspect that this work has so much interest for our Society, since Prince Henry himself was the centre and source of all that activity in geographical discovery which made that period so remarkable.

Commencing with a description of the state of geographical knowledge in Prince Henry's time, and of the vague notions which prevailed respecting those unexplored regions which were bathed by the waters of the Sea of Darkness, Mr. Major leads us on through years of costly failure to the story of those wonderful discoveries which were made under the auspices of Prince Henry himself. In this portion of the work alone we are presented with an abundance of new material in the history of geography. The discovery of the Coast of Africa, from Cape Bojador to Sierra Leone, is given from the contemporary accounts of Azurara, Cadamosto, and Diogo Gomez; the first and last of which authors were previously unknown to English literature. Another original feature in the work is the circumstantial and conclusive refutation of a variety of claims set up on behalf of Genoese, Catalans, and Frenchmen, to priority in discovery of the Coast of Guinea. With respect to the important groups of islands in the Atlantic, we now for the first time learn that the Azores and Madeira group were discovered so early as the beginning of the fifteenth century by Genoese navigators in the service of Portugal, while for the Cape Verde Islands we are supplied with the name of an entirely new original discoverer, Diogo Gomez, in lieu of his supplanter, the Genoese Antonio de Nolli. The romantic story of the later accidental discovery of Madeira by the Englishman, Machin, which led to the exploration and colonisation of the island by Prince Henry's navigators, has now been definitely cleared from doubt, while the complete history of the colonisation of the Azores is for the first time given in English. Still these are but incidents in comparison with the great 'Results' of the life of Prince Henry, which it is the real purpose of this comprehensive work to set forth. Within the small compass of a single century from the rounding of Cape Bojador, in 1434, we find more than one-half of the world opened up to man's knowledge by an unbroken chain of discovery, which originated in the genius and the efforts of this one man, whose name is all but unknown. The coasts of Africa visited—the Cape of Good Hope rounded—the New World disclosed—the seaway to India, the Moluccas and China laid open, the globe circumnavigated—and last, not least (for here I would take occasion to say that Mr. Major has made this subject peculiarly his own), Australia discovered. "Such were the stupendous results," to use Mr. Major's words, "of a great thought and of indomitable perseverance, in spite of twelve years of costly failure and disheartening ridicule. Had that failure and that ridicule produced on Prince Henry the effect which they ordinarily produce on other men, it is impossible to say what delays would have occurred before these mighty events would have been realised; for it must be borne in mind that the ardour not only of his own sailors, but of surrounding nations, owed its impulse to this pertinacity of purpose in him."

Keith Johnston's New Atlases.—Among the useful and important cartographical publications brought out by our Associate Mr. A. Keith Johnston, I have to mention the 'Handy Royal Atlas,' published this year, as a reliable work, giving the most recent discoveries by our travellers in Central Africa and Asia, and, for its size and form, easy to be consulted. I have also to notice with especial satisfaction the forthcoming issue by Mr. Johnston of a series of Elementary Atlases of General, Physical, Historical, and Scriptural Geography, which, being sold at extremely low prices, will, it is hoped, diffuse very widely much useful knowledge. The same indefatigable author is also about to issue during the summer a complete series of Geographical Text-books, arranged on a new plan, and in a style calculated to attract students, at the cost of a few pence each. Each map will have an accompanying handbook, so that the attention of the pupil or student will be limited to one subject at a time. These cheap and good scientific publications coming out now, when the better instruction of the people is so much advocated, cannot fail to be highly serviceable in popularising the study of Geography.

Chapman's Travels in South Africa.—Among recent publications, the narrative of Mr. James Chapman's Travels in South Africa, during a period of fifteen years, merits a commendatory notice on the part of geographers and naturalists. The ground he travelled over lies between Natal on the south, and the Zambesi River on the north, and from the Limpopo on the east, to Walvisch Bay on the west. Few persons occupied in trade as Mr. Chapman was could have given us such good sketches of the outlines of the country, and so many interesting details respecting the geology and botany of the wild regions he traversed. European readers may well be astonished to learn from Mr. Chapman, among the wonders of natural history which he witnessed, that in one district he walked 7 inches deep in a body of locusts, which devoured a cornfield in two hours. Many persons must doubtless be interested in the valuable contributions in various branches of natural history, whilst some of the sketches of the gorgeous scenes at and around the great Falls of the Zambesi, as executed by Mr. Baines, are telling adjuncts. I am pleased to see that the book has been well spoken of by able reviewers, one of whom, after recommending it to all who are interested in Africa, thus writes:—"As a traveller he has been adventurous and energetic, as a narrator truthful and modest; and it must not be forgotten that to such men as Mr. Chapman the gratitude of mankind is due." *

Millingen's Observations in Armenia and Kurdistan.—A work has recently appeared in Paris, and in the French language, which from its title would be supposed to be simply of historical and political interest, but which, in reality, contains a considerable amount of geographical information concerning parts of the Turkish empire of which very little is known. The work is entitled 'La Turquie sous la Règne d'Abdul-Aziz,' and contains the experiences of the author, Mr. Frederick Millingen, during three years' military service in the eastern part of Armenia, or northern Kurdistan. The numerous details gleaned by this intelligent observer concerning the tribes of Kurds in that region will prove interesting to the ethnologist; and the map attached to the volume, in which the tract of country lying between the south-eastern shores of Lake Van and the Persian frontier is delineated, recommend the work to the notice of geographers. The chief utility of the map is, that the districts peopled by the different Kurdish tribes, together with the names of their numerous villages, are laid down from the personal observations of the author.

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* 'Spectator,' April 11, 1868, p. 414.

Cornelissen's Treatise on the Temperature of the Sea off the Cape of Good Hope.—One of those memoirs on oceanic hydrography which are so important and valuable for the bearing they have on practical seamanship, as well as on the generalizations of physical geography, has recently appeared in the publications of the Royal Meteorological Institute of the Netherlands, from the pen of Captain J. E. Cornelissen, of the Dutch Navy. The conclusions arrived at by the author—after tabulating the results of nearly thirty thousand observations of the temperature of the sea, systematically made by Dutch shipmasters—are, that the warm Mozambique current spreads out towards the south of the Cape, and that the cold South polar current drives it towards the coast of Africa, the two alternately encroaching on each other's domain; and that the various positions, during the year, of these oceanic streams are explicable only by the existence of a submarine reef or bank, between 26° and 27° E. longitude and between 37° and 38° S. latitude, having a gentle slope to the south, and a steep inclination on the north and north-eastern side. Similar observations have been made by English observers; and, indeed, the memoir of Captain Cornelissen should be studied in connexion with the important paper read before our own Society by Mr. Henry Toynbee, and published in the thirty-fifth volume of our Journal; the merit of the Dutch memoir consisting in the co-ordination of a vast number of observations, made in all seasons, and recorded in the logs deposited by the intelligent seamen of that nation in the nautical department of the Dutch Government.

Jordan's Vis Inertiæ in the Ocean.—Mr. Wm. Leighton Jordan, our Associate, has recently published a treatise on the action of vis inertiæ in the ocean, a sequel to two former volumes on the elements as affected by the motions of the earth. In this work Mr. Jordan advances a series of propositions, carefully arranged, and based on the assumption that the waters of the ocean are acted on by the axial and orbital motion of the earth in a different degree to the solid matter of the globe; and, by his deductions, he accounts for most of the well ascertained currents of the ocean, and also infers that others yet undetected exist, by which the known circulation of the entire mass of waters is maintained. It is a subject of great difficulty, and one on which we are entirely deficient in data whereon to form a theory based on facts.

EUROPE.—*Spain.*—I am indebted to Don Francisco Coello, our able Honorary Corresponding Member at Madrid, for interesting details regarding the official surveys and the issue of Government maps in Spain, during the last year. In his communication he laments, as all men of science must do, the partial suspension of the great cadastral survey of the country, of which he was the director, and which employed a large staff of scientific men in working out, on a magnificent scale, the topography, hydrology, and geology of this imperfectly known part of Europe. Even the results of the preliminary surveys of the basins of the Douro, the Tagus, and the Guadiana, although finished in the same form as the Memoirs on the Ebro * and Guadalquivir, which had previously attracted so much attention, have been suffered to remain unpublished. The only portion of this national work which lingers on is the survey by small parties of limited districts previously commenced, and the neighbourhoods of large towns. Since the suspension of geodetical operations, Don Francisco Coello informs me that the definitive calculations have been completed on the meridian and parallel of Madrid, and in other directions; and that the lines were being connected with the Portuguese triangulation on the one hand, and the French—at Biarritz—on the other. A line of levels had also been commenced, with a view to the accurate determination of the altitude of Madrid above the sea-level, which is still a matter of dispute, and, although this work has been stopped like the rest of the survey, many important points in the mountain-chains of the Peninsula have been accurately measured. Thus it has been finally ascertained that the Peak of Mulhacen, in the Sierra Nevada, is the highest point in Spain, being 11,423 feet high, and exceeding the Pic de Nethou, the highest point in the Spanish portion of the Pyrenees, which is only 11,168 feet. The altitudes of many other mountains, exceeding 2000 mètres (6561 feet), under the meridian and parallel of Madrid, have been also determined with similar accuracy.

In conclusion, our Associate informs me that a number of new charts of the Philippine Islands have been issued by the Hydrographical Depôt of Madrid, and that the General Staff have published an Itinerary Map of Spain on a scale of $\frac{1}{500,000}$, in twenty sheets; copies of these maps are promised to our Society, and will be acceptable additions to our collection.

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* See Anniversary Address, 1866, 'Journal,' vol. xxxvi., p. clxv.

Switzerland.—According to a report communicated by our esteemed Correspondent, Mons. J. M. Ziegler, the exact measurement of levels in Switzerland determined on as a consequence of Swiss participation in the European Geodetical Congress, and entrusted to those able astronomers M. Hirsch of Neuchatel and M. Plantamour of Geneva, has made progress during the year 1867. By these operations all elevations, previously hypsometrically determined, will be reviewed throughout Switzerland. So far the work performed by Swiss surveyors has contrasted favourably with that done in connexion with it by surrounding States, and has been complimented by the astronomer Hansen of Gotha, President of the Central Board. Probably as a consequence of the grandeur and interest of its natural phenomena, in few countries is the study of physical geography more cultivated than in Switzerland. As evidence of this, may be cited the number of maps and treatises which annually appear, relating to the different phases of this fruitful department of science. I am informed by M. Ziegler that, since the completion of the Federal Survey, the measurement of the Swiss glaciers was determined on; and that the first series of the results (the work of M. Kindig) has been published, comprising the glaciers of South-Western Valais. In connexion with this subject, and the conditions which influence the climate of their country, the Swiss Natural Science Society have offered a prize to encourage investigations concerning the warm southerly wind or *Föhn.* The same Society has a Meteorological Section, and it must be allowed that Switzerland offers many questions of interest to stimulate their inquiries.

ARCTIC RESEARCHES.—Having participated during many years in the efforts made by our Society to encourage Arctic exploration, it has been my pleasing duty, handed down to me by my eminent predecessor Sir John Barrow, to welcome and encourage every proposal which has been brought before us, tending to add lustre to the fame that the British nation has achieved in the delineation of the geography of a region which we have almost made our own.

For a number of years the hope was entertained that a passage between the Atlantic and Pacific Oceans, useful in commerce, might be realised; but, though the honour of effecting a transit by sea and ice was first accomplished by Franklin, who sealed his success with his life, and shortly after by McClure, and though many of their brave associates, from the days of Parry to those of McClintock,

have explored and laid down the forms of large islands constituting a large archipelago in these frozen climes, all hope of ever establishing a practicable sea-passage has vanished. For, by our researches we now know that, in any latitudes which we have searched, the Arctic Sea is beset with islands, and the intensity of the cold thereby so much increased, that the narrow passages between them are necessarily frozen, and impassable to ships.

Of late years, however, our interest has been awakened to the accomplishment of another great Arctic desideratum, or that of reaching the North Pole itself. As British geographers, we naturally supported this project, in the consideration that the nation which had already added so much to our knowledge of these regions should crown the work, by determining whether an open sea or land existed at the Pole itself. The project was warmly supported by zoologists, botanists, meteorologists, and physicists; and, fortified by the support of the British Association for the Advancement of Science, this Society urged the Government to employ a small portion of our great maritime force in settling this important question. If the most stirring eloquence could have prevailed, the Memoir of that distinguished Arctic explorer Sherard Osborn, read to us in 1865, should have induced any Board of Admiralty to countenance the effort we called for. But our rulers paused, chiefly because we, the Geographers, had not made up our minds as to whether the British efforts should be made by the way of Baffin's Bay and Smith Sound, or by Spitzbergen; our associates being divided in opinion. And even in regard to the Spitzbergen route, some believed that the expedition ought to proceed between that island and Nova Zembla, and others preferred coasting along the east and north shores of Greenland. Hence the refusal of the Admiralty to sanction any expedition in 1865, though Osborn had clearly pointed out the small amount of exploration, comparatively speaking, which remained to be accomplished in solving the desired problem.

Recently the subject—which, though dormant, has never been abandoned by us—has been revived with vigour in Germany, entirely through the energy and skill of our Medallist Dr. Petermann, who, warmly advocating the voyage by Spitzbergen, has at his own risk fitted out a Norwegian yacht of 80 tons, the *Germania*, commanded by Karl Koldewey, which sailed probably to-day from Bergen in Norway, and will proceed to lat. 74½° N., along the eastern coast of Greenland. The French, also, have been roused by the appeal of a zealous young naval officer, Lieutenant Lam-

bert, to fit out an expedition to enter the Arctic Seas by Behring Strait; and, finally, we have once more been stimulated by Sherard Osborn to go forward in the cause he has so much at heart. Whilst in his last communication he gave many strong and good reasons for preferring, as heretofore, the route by Smith Sound to any other line, he is, I know, above all desirous that we should lie no longer on our oars, but that, at the latest in the ensuing year, whichever route may be preferred, something should be done in reopening this fine school for the training of hardy and adventurous seamen.

In his last Memoir, Captain Sherard Osborn gives great credit to the views of Dr. Petermann, who has indeed justly entitled himself to our warmest acknowledgments for the sagacity and talent with which he long ago deduced the existence of those northern lands, and laid them down in his maps from the evidence of the Russian explorers, and recently again examined by way of Behring Strait. At the same time the results of the inquiries of the Swedish expedition at and around Spitzbergen are, as Osborn thinks, antagonistic to the success of any effort in that direction.

Whilst such are the preparations and hopes in European countries, a great amount of fresh knowledge has been obtained by our American kinsmen, who in their whaling-vessels have pushed their enterprise through Behring Strait, far beyond the land first sighted by Kellett, and beyond 73° N. lat. have coasted extensive high lands which lie off the coast of Siberia, from which they are, it is thought, separated by the sea first seen by Wrangell. These, indeed, are great advances since the days when Collinson (whose discoveries in another direction have never been surpassed) determined the outline of the whole northern coast of America, and Kellett first saw Herald Island.

One of these masters of American whalers—Captain Long—has communicated to the 'Pacific Commercial Advertiser of Honolulu,' a report which, in giving a lively sketch of the progress of Arctic discovery from the days of Hudson and Frobisher, has enunciated the opinion that, if ever a transit by water be made between the Eastern and Western Oceans, it will not be by lines hitherto tried, but by an enterprise directed from Behring Strait.

Looking to the fact that the Arctic Sea is bounded by North America, Greenland, Spitzbergen, Nova Zembla, and Siberia, and that it is the recipient of the enormous bodies of water poured into it by many large rivers, he infers that the surplus must be mainly discharged either by Spitzbergen or by Smith Sound and Baffin's Bay. Now, all navigators who have endeavoured to get towards the Pole by these lines have, he says, always met with a powerful outflow of water transporting and moving out the ice southward into the Atlantic. Thus it was that Parry, having proceeded with great perseverance in sledges 292 miles northwards, and having reached lat. 82° 45′, was only 172 miles from his starting-point, so steadily had the broken ice been carrying him and his party southwards by this great channel. Considering that the same outflow of water and ice has been met with by all explorers to the north of Smith Sound, Captain Long maintains that Behring Strait stands in favourable contrast to the other openings into the region of the Polar Sea, and is the channel in which the effort should be made. He affirms, from experience of whalers since 1847, that no great body of water finds its way south through Behring Strait; and that, at least in the spring and summer, the current is always found setting to the north, owing, as he infers, to the discharge of the rivers on the North American shore and that of the Anadyr on the Asiatic coast. He suggests, therefore, that a strong vessel of from 200 to 300 tons' burthen, and provided with sufficient steam-power to get through temporary obstacles, should follow the Asiatic shore from Behring Strait as far as Cape Kekurnai or Cape Schelagskoi. From some point between those capes the course would be to the north of the Laachoo Islands, whence the course towards Spitzbergen or the Pole would be influenced by the currents proceeding from the great Siberian rivers. If the vessel were obstructed by ice to the north of these islands, the outflow current, though not so strong as immediately to the north of Spitzbergen or in Baffin's Bay, would, he thinks, eventually carry the ship through one of the channels into the Atlantic.

Another route by which the voyage might, in the opinion of Captain Long, be accomplished, is to proceed from Behring Strait to the mouth of the Lena, then directly north beyond Cape Sievero Vostoschni, and then westwards towards Spitzbergen.

The letter of this experienced whaling captain is highly entitled to the notice of all persons interested in Arctic exploration, inasmuch as he assigns strong grounds for believing that hitherto we have been toiling like Sisyphus against natural obstacles; he believes that notwithstanding a few minor difficulties on the Siberian coast, if we once get a stout but small vessel into the current caused by the Yenissei and other great Siberian streams, that she would,

if entangled in the pack, be unquestionably carried forward into the Atlantic.

Captain Long concludes that the passage from the Pacific to the Atlantic Ocean will eventually be accomplished from Behring Strait by one of the two routes which he has indicated, and adds, "I have as much faith in this as I have in any uncertain future event, and much more than I had fifteen years ago in the Atlantic telegraph."

Irrespective, however, of this possible but useless transit from the Pacific to the Atlantic, a fourth plan by which the North Pole may be reached has been recently brought under my notice by an experienced captain of a British whaler, David Gray, and which he thinks has many advantages over the three routes by Smith Sound, Spitzbergen, or Behring Strait. Writing to me on the eve of his departure for his usual fishing-station, off the east coast of Greenland, he maintains from his long observations of the tides, the set of the currents, and the state of the ice in that region at various seasons of the year, that there will be little difficulty in carrying a vessel in *a single season to a very high latitude, if not to the Pole itself.* He proposes to take the ice at about 72°, where there is a deep bight running towards Shannon Island, and thence he could follow the continent of Greenland as long as it trended in the desired direction, and afterwards push through the loose fields of ice, which can be easily penetrated, as proved by Scoresby, Clavering, and Sabine.

This project is supported by numerous good observations; among which the rarity of icebergs in those wide seas, probably affected by the warmth of the Gulf Stream, in comparison with their abundance in the narrow strait of Smith Sound, would seem to give to his route a decided advantage over that on the west coast of Greenland. Another advantage is, that the ice on the east coast is field or floe ice, which is always in motion even in winter, as proved by ships that were beset as far north as 78°, being driven down during winter and autumn to Cape Farewell. Adducing other reasons for preferring this route, Captain David Gray believes that an expedition might reach Shannon Island in fourteen days, and would be in its field of operation six weeks sooner than if it were sent to Smith Sound; and therefore that a vessel sailing in June would have before it for research the greater part of July, all August, and the half of September, in which time the object might be accomplished. Failing of this, and it being necessary to winter, there are, it is

said, many bays and good harbours on the east coast of Greenland which are available, where, according to the indications observed, there seems to exist an average amount of animal life compared with other Arctic districts. I refer you to Captain David Gray's sensible letter on this subject, which will be published in our 'Proceedings;' and in the mean time it is highly gratifying to know that the German, or, as it may be truly called, the Petermann Expedition, which is to sail to-day from Bergen, is about to proceed on the same line as that advocated by the experienced whaling commander Captain David Gray.

Before I dismiss the subject of Arctic researches I must state that I have recently been informed by Professor A. E. Nordenskiold, of Stockholm, that the Swedish Government are preparing to make, during the approaching summer, an attempt to advance into the Polar Sea beyond Spitzbergen. A powerful screw-steamer, expressly built for winter navigation, has been granted for the purpose, and is to be provisioned for twelve months. Already the Swedish Government have gained honour by their encouragement of successive expeditions to Spitzbergen for the measurement of an arc of the meridian, and the scientific exploration of the islands, in which Professor Nordenskiold took part; that success may attend the present enterprise must be the prayer of all Geographers.

BRITISH NORTH AMERICA.—In an able review of the Memoir read by Mr. Alfred Waddington, during the present session, "On the Physical Geography of British Columbia," Dr. Cheadle has recently given[*] us a very suggestive forecast of the probable future of our North American Colonies, if those on the Pacific, so rich in coal and gold, be not speedily connected with those east of the Rocky Mountains and with Canada. Coming from the fellow-traveller of Lord Milton, who three years ago called public attention to the important subject of a north-west passage by land, I am happy to see Dr. Cheadle coincides with me in assigning great praise to Mr. Waddington, for the perseverance and intelligence with which he has promoted, at great pecuniary sacrifice, the exploration of British Columbia during many years, and for having been the first to indicate the best line of route between the Leatherhead Pass of the Rocky Mountains (described by Dr. Rae, Lord Milton and Dr. Cheadle), and Bute Inlet on the Pacific. It is manifest that the

if entangled in the pack, be unquestionably carried forward into the Atlantic.

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[*] 'Pall Mall Gazette,' April 15, 1868, p. 3.

Captain Long concludes that the passage from the Pacific to the Atlantic Ocean will eventually be accomplished from Behring Strait by one of the two routes which he has indicated, and adds, "I have as much faith in this as I have in any uncertain future event, and much more than I had fifteen years ago in the Atlantic telegraph."

Irrespective, however, of this possible but useless transit from the Pacific to the Atlantic, a fourth plan by which the North Pole may be reached has been recently brought under my notice by an experienced captain of a British whaler, David Gray, and which he thinks has many advantages over the three routes by Smith Sound, Spitzbergen, or Behring Strait. Writing to me on the eve of his departure for his usual fishing-station, off the east coast of Greenland, he maintains from his long observations of the tides, the set of the currents, and the state of the ice in that region at various seasons of the year, that there will be little difficulty in carrying a vessel in *a single season to a very high latitude, if not to the Pole itself.* He proposes to take the ice at about 72°, where there is a deep bight running towards Shannon Island, and thence he could follow the continent of Greenland as long as it trended in the desired direction, and afterwards push through the loose fields of ice, which can be easily penetrated, as proved by Scoresby, Clavering, and Sabine.

This project is supported by numerous good observations; among which the rarity of icebergs in those wide seas, probably affected by the warmth of the Gulf Stream, in comparison with their abundance in the narrow strait of Smith Sound, would seem to give to his route a decided advantage over that on the west coast of Greenland. Another advantage is, that the ice on the east coast is field or floe ice, which is always in motion even in winter, as proved by ships that were beset as far north as 78°, being driven down during winter and autumn to Cape Farewell. Adducing other reasons for preferring this route, Captain David Gray believes that an expedition might reach Shannon Island in fourteen days, and would be in its field of operation six weeks sooner than if it were sent to Smith Sound; and therefore that a vessel sailing in June would have before it for research the greater part of July, all August, and the half of September, in which time the object might be accomplished. Failing of this, and it being necessary to winter, there are, it is

said, many bays and good harbours on the east coast of Greenland which are available, where, according to the indications observed, there seems to exist an average amount of animal life compared with other Arctic districts. I refer you to Captain David Gray's sensible letter on this subject, which will be published in our 'Proceedings;' and in the mean time it is highly gratifying to know that the German, or, as it may be truly called, the Petermann Expedition, which is to sail to-day from Bergen, is about to proceed on the same line as that advocated by the experienced whaling commander Captain David Gray.

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CENTRAL AMERICA.—*Isthmus of Darien.*—Our attention has been directed, during the present session, to the ever-recurring and important subject of new lines of transit and projects of ship-canals across the great American isthmus. At one of our evening meetings, our enterprising associate, Mr. John Collinson, gave us an interesting narrative of his preliminary survey (in which he was accompanied by Lieutenant S. P. Oliver) across the unknown eastern part of Nicaragua, undertaken with a view to the selection of a line for a railway across the country, to terminate at Pim's Bay on the Atlantic side, and Realejo on the Pacific. The highest point of the line surveyed was found to be only 748 feet above the level of the Atlantic, and 620 feet above that of Lake Nicaragua; and the country, except for a few miles near the lake, was covered with the dense and lofty virgin-forest, which is characteristic of the lower levels in Tropical America.

The most easterly part of the American isthmus—the Isthmus of Darien—is that which has always presented the greatest difficulties to the explorer. The terrible sufferings of the survey-parties sent out to explore the line of the Savannah River and Port Escoces, fourteen years ago, when several members of the expedition perished of hunger in the trackless forests, must still be fresh in the memory of many persons. Notwithstanding, however, the failure of all previous attempts to cross the isthmus, M. Lucien de Puydt, under the auspices of the French Government, has devoted himself during the last few years to the examination of this difficult country. In 1861 he explored the line of the River Lara and Chuqunaque, and penetrated as far as was possible by water towards the sources of the River Tuyra; and believing that he then saw the chain of the Andes in that direction broken up into isolated hills, with two passes between them, revisited the district from the eastern or Atlantic side in 1865, and succeeded in reaching one of these passes, which he declares to be not more than about 120 feet above the sea-level. The district of M. de Puydt's later exploration is one of the least known of the Isthmus of Darien, lying along the course and near the sources of the Tanela River, which disembogues in the Gulf of Uraba. Although we may regret the insufficiency of the observations of altitudes taken by the traveller,—and he describes his exploration as only preliminary to a more perfect survey,—the Memoir communicated to us by M. de Puydt must be admitted to contain much information on the geography, ethnology, and productions of a region hitherto almost unknown.

Before quitting the subject of the Isthmus of Darien, I have to record that a most useful volume on the subject of interoceanic transit has been published by Admiral Davis, of the National Observatory, Washington, which contains an outline of nearly all the various projects for connecting the two oceans, copiously illustrated by maps.

South America.—Last year it was my pleasing duty to record the continuation of the important explorations of the Purus and its tributaries by our associate and medallist, Mr. Chandless, which added so much to our knowledge of South American geography. Although I have not, on the present occasion, to bring to your notice any fact of such striking interest as this, much has been done in the investigation of the other great rivers of the Amazons basin, chiefly through the Peruvians, who have lately made strenuous efforts to explore the rivers in their eastern territory, with the view to the opening of new lines of communication. The reports of Peruvian officers engaged in these fluvial explorations have been published in the official Gazettes of Lima; but have not, as far as I am aware, been translated into English, or made known to the scientific public in Europe.

The expedition up the Ucayali and Pachitea rivers, which I noticed in my last year's Address as having succeeded in proving the navigability of these tributaries of the Amazons to within 325 miles of Lima, has been followed by a survey of the land-route between the head of the navigation and the city of Huanuco, in the inhabited parts of Peru. A brief account of this survey has been sent to our Society by our Corresponding Member, Don M. Felipe Paz Soldan, accompanied by a tracing of the map of the route, which will be interesting to English geographers, delineating the unexplored country into which our travellers Smith and Lowe found it impossible to advance in 1834. The port which is to be the future place of embarkation at the foot of the Andes, for the voyage to Europe *viâ* the Amazons, has been named "Puerto General Prado" after the President of Peru; and is situated at the junction of the River Mayro with the Palcazo, more than 3600 miles distant from the Atlantic. The survey was executed by a Hydrographic Commission, under the direction of Admiral Tucker, a North-American naval officer, now in the Peruvian service; and all the principal points on the line have been fixed by astronomical observation. Profile sections of the route accompany the map, and we are promised a narrative of the expedition as soon as it is ready.

Another important undertaking has been the exploration of the River Javari in 1866, by a joint Frontier Commission of Peruvians and Brazilians. In all maps this tributary of the Amazons is represented as running from south to north, and it had been fixed upon in the last century as the boundary line, in this direction, between the colonial territories of Spain and Portugal; but the result of the recent exploration has been to show that the general direction of the stream is for several hundred miles south-east to north-west, or nearly parallel to the Amazons, and that it has numerous abrupt windings. A report of the survey has been sent to us by Don Manuel R. Paz Soldan, nephew of our Lima correspondent, who was the Peruvian Commissioner; but a great part of the journals and observations, as well as the instruments, were lost in a murderous affray with the wild Indians of this dangerous region,—a hundred savages armed with bows and poisoned arrows having suddenly attacked the party in a narrow part of the stream, walled-in by high forests, and killed the Brazilian Commissioner, besides wounding five others, including Señor Paz Soldan himself. The expedition had thus to turn back, leaving their large vessel in the hands of the Indians, and escaping in a small boat. The author of the Report speaks of the wide extent of fertile country watered by the Javari and other rivers, still unknown, and likely long to remain so, on account of the ferocious nature of its inhabitants.

The River Morona, an affluent of the left bank of the Upper Amazons, near the limit of navigation, was explored last year by the steamer *Napo*, under the command of Captain M. A. Vargas. The country on both sides of this little-known stream is scantily peopled by Indians, who obtain gold, for barter with white traders, with the greatest facility, by washing the sand of the beaches in the rudest manner. Captain Vargas observed the method of working, and obtained samples of the gold, which is of fine quality, and he concludes his interesting report by expressing the opinion that the valleys of several of these northern tributaries abound in gold, the search for which will soon attract a large population.

Our indefatigable associate Professor Raimondi continues without interruption his valuable explorations of the Andean valleys of Central Peru, and has recently examined the course of the River Pulperia, an affluent of the Apurimac,—a journey undertaken with a view to ascertaining how far up the latter river was navigable. His memoir on this subject, which we have already received, like the previous one published in the last volume of our 'Journal,' abounds in interesting observations not only of the topography, but also of the physical geography and botany of this previously unknown district.

In other parts of South America there is little to record, except that Captain Burton has recently returned to his Consulate at Santos, after a journey of seven months through the interior of Brazil, and down the River San Francisco. His report of the journey may be shortly expected, and, being from the pen of so experienced and able a traveller, it cannot but contain much that will be new and interesting.

Australia.—The chief additions to our knowledge of Australian geography have been made, as in the previous year, by small expeditions from the outskirts of the populated districts, undertaken to discover new lands suitable for settlement. In this way we are gradually becoming acquainted with the interior portions of Queensland and Western Australia. Under the enlightened encouragement of Governor Hampton, in the latter colony, much useful knowledge of the country between Nickol Bay and the Tropic of Capricorn has been obtained by parties under the leadership of Mr. T. C. Sholl, who has established the identity of the Ashburton with the Curlew River, and discovered several new streams flowing towards Exmouth Gulf.

Discoveries of some importance have been made in 1867, in the northern territory belonging to the colony of South Australia. After the failure of the Adam Bay settlement, the enterprising Government of Adelaide despatched Captain Cadell in a steamer named the *Eagle*, to explore the coast between the mouth of the Adelaide River and the Gulf of Carpentaria, previously imperfectly surveyed by Flinders and afterwards by Stokes, with a view to the discovery of some better site for a settlement than Adam Bay. The tribes, together with the names of their numerous villages, are laid down from the personal observations of the author.

Cornelissen's Treatise on the Temperature of the Sea off the Cape of Good Hope.—One of those memoirs on oceanic hydrography which are so important and valuable for the bearing they have on practical seamanship, as well as on the generalizations of physical geography, has recently appeared in the publications of the Royal Meteorological Institute of the Netherlands, from the pen of Captain J. E. Cornelissen, of the Dutch Navy. The conclusions arrived at by the author—after tabulating the results of nearly thirty thousand observations of the temperature of the sea, systematically made by Dutch shipmasters—are, that the warm Mozambique current spreads out towards the south of the Cape, and that the cold South polar current drives it towards the coast of Africa, the two alternately encroaching on each other's domain; and that the various positions, during the year, of these oceanic streams are explicable only by the existence of a submarine reef or bank, between 26° and 27° E. longitude and between 37° and 38° S. latitude, having a gentle slope to the south, and a steep inclination on the north and northeastern side. Similar observations have been made by English observers; and, indeed, the memoir of Captain Cornelissen should be studied in connexion with the important paper read before our own Society by Mr. Henry Toynbee, and published in the thirty-fifth volume of our Journal; the merit of the Dutch memoir consisting in the co-ordination of a vast number of observations, made in all seasons, and recorded in the logs deposited by the intelligent seamen of that nation in the nautical department of the Dutch Government.

Jordan's Vis Inertiæ in the Ocean.—Mr. Wm. Leighton Jordan, our Associate, has recently published a treatise on the action of vis inertiæ in the ocean, a sequel to two former volumes on the elements as affected by the motions of the earth. In this work Mr. Jordan advances a series of propositions, carefully arranged, and based on the assumption that the waters of the ocean are acted on by the axial and orbital motion of the earth in a different degree to the solid matter of the globe; and, by his deductions, he accounts for most of the well ascertained currents of the ocean, and also infers that others yet undetected exist, by which the known circulation of the entire mass of waters is maintained. It is a subject of great difficulty, and one on which we are entirely deficient in data whereon to form a theory based on facts.

EUROPE.—*Spain.*—I am indebted to Don Francisco Coello, our able Honorary Corresponding Member at Madrid, for interesting details regarding the official surveys and the issue of Government maps in Spain, during the last year. In his communication he laments, as all men of science must do, the partial suspension of the great cadastral survey of the country, of which he was the director, and which employed a large staff of scientific men in working out, on a magnificent scale, the topography, hydrology, and geology of this imperfectly known part of Europe. Even the results of the preliminary surveys of the basins of the Douro, the Tagus, and the Guadiana, although finished in the same form as the Memoirs on the Ebro * and Guadalquivir, which had previously attracted so much attention, have been suffered to remain unpublished. The only portion of this national work which lingers on is the survey by small parties of limited districts previously commenced, and the neighbourhoods of large towns. Since the suspension of geodetical operations, Don Francisco Coello informs me that the definitive calculations have been completed on the meridian and parallel of Madrid, and in other directions; and that the lines were being connected with the Portuguese triangulation on the one hand, and the French—at Biarritz—on the other. A line of levels had also been commenced, with a view to the accurate determination of the altitude of Madrid above the sea-level, which is still a matter of dispute, and, although this work has been stopped like the rest of the survey, many important points in the mountain-chains of the Peninsula have been accurately measured. Thus it has been finally ascertained that the Peak of Mulhacen, in the Sierra Nevada, is the highest point in Spain, being 11,423 feet high, and exceeding the Pic de Nethou, the highest point in the Spanish portion of the Pyrenees, which is only 11,168 feet. The altitudes of many other mountains, exceeding 2000 mètres (6561 feet), under the meridian and parallel of Madrid, have been also determined with similar accuracy.

In conclusion, our Associate informs me that a number of new charts of the Philippine Islands have been issued by the Hydrographical Depôt of Madrid, and that the General Staff have published an Itinerary Map of Spain on a scale of $\frac{1}{500,000}$, in twenty sheets; copies of these maps are promised to our Society, and will be acceptable additions to our collection.

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* See Anniversary Address, 1866, 'Journal,' vol. xxxvi., p. clxv.

Switzerland.—According to a report communicated by our esteemed Correspondent, Mons. J. M. Ziegler, the exact measurement of levels in Switzerland determined on as a consequence of Swiss participation in the European Geodetical Congress, and entrusted to those able astronomers M. Hirsch of Neuchatel and M. Plantamour of Geneva, has made progress during the year 1867. By these operations all elevations, previously hypsometrically determined, will be reviewed throughout Switzerland. So far the work performed by Swiss surveyors has contrasted favourably with that done in connexion with it by surrounding States, and has been complimented by the astronomer Hansen of Gotha, President of the Central Board. Probably as a consequence of the grandeur and interest of its natural phenomena, in few countries is the study of physical geography more cultivated than in Switzerland. As evidence of this, may be cited the number of maps and treatises which annually appear, relating to the different phases of this fruitful department of science. I am informed by M. Ziegler that, since the completion of the Federal Survey, the measurement of the Swiss glaciers was determined on; and that the first series of the results (the work of M. Kindig) has been published, comprising the glaciers of South-Western Valais. In connexion with this subject, and the conditions which influence the climate of their country, the Swiss Natural Science Society have offered a prize to encourage investigations concerning the warm southerly wind or *Föhn.* The same Society has a Meteorological Section, and it must be allowed that Switzerland offers many questions of interest to stimulate their inquiries.

ARCTIC RESEARCHES.—Having participated during many years in the efforts made by our Society to encourage Arctic exploration, it has been my pleasing duty, handed down to me by my eminent predecessor Sir John Barrow, to welcome and encourage every proposal which has been brought before us, tending to add lustre to the fame that the British nation has achieved in the delineation of the geography of a region which we have almost made our own.

For a number of years the hope was entertained that a passage between the Atlantic and Pacific Oceans, useful in commerce, might be realised; but, though the honour of effecting a transit by sea and ice was first accomplished by Franklin, who sealed his success with his life, and shortly after by McClure, and though many of their brave associates, from the days of Parry to those of McClintock,

have explored and laid down the forms of large islands constituting a large archipelago in these frozen climes, all hope of ever establishing a practicable sea-passage has vanished. For, by our researches we now know that, in any latitudes which we have searched, the Arctic Sea is beset with islands, and the intensity of the cold thereby so much increased, that the narrow passages between them are necessarily frozen, and impassable to ships.

Of late years, however, our interest has been awakened to the accomplishment of another great Arctic desideratum, or that of reaching the North Pole itself. As British geographers, we naturally supported this project, in the consideration that the nation which had already added so much to our knowledge of these regions should crown the work, by determining whether an open sea or land existed at the Pole itself. The project was warmly supported by zoologists, botanists, meteorologists, and physicists; and, fortified by the support of the British Association for the Advancement of Science, this Society urged the Government to employ a small portion of our great maritime force in settling this important question. If the most stirring eloquence could have prevailed, the Memoir of that distinguished Arctic explorer Sherard Osborn, read to us in 1865, should have induced any Board of Admiralty to countenance the effort we called for. But our rulers paused, chiefly because we, the Geographers, had not made up our minds as to whether the British efforts should be made by the way of Baffin's Bay and Smith Sound, or by Spitzbergen; our associates being divided in opinion. And even in regard to the Spitzbergen route, some believed that the expedition ought to proceed between that island and Nova Zembla, and others preferred coasting along the east and north shores of Greenland. Hence the refusal of the Admiralty to sanction any expedition in 1865, though Osborn had clearly pointed out the small amount of exploration, comparatively speaking, which remained to be accomplished in solving the desired problem.

Recently the subject—which, though dormant, has never been abandoned by us—has been revived with vigour in Germany, entirely through the energy and skill of our Medallist Dr. Petermann, who, warmly advocating the voyage by Spitzbergen, has at his own risk fitted out a Norwegian yacht of 80 tons, the *Germania*, commanded by Karl Koldewey, which sailed probably to-day from Bergen in Norway, and will proceed to lat. 74½° N., along the eastern coast of Greenland. The French, also, have been roused by the appeal of a zealous young naval officer, Lieutenant Lam-

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he constructed a map, he became acquainted with Mr. Hartley an elephant-hunter, who, in quest of ivory, had visited all the highest lands of the region which forms the broad-backed lofty watershed between the rivers Zambesi, on the north, and Limpopo on the south. Being informed by Hartley of the existence in these high and rocky lands of the relics of ancient metalliferous excavations, Mr. Carl Mauch explored them, hammer in hand, and in two separate localities *—the one in s. lat. 20° 40′, and on an affluent of the Limpopo, the other on an affluent of the Zambesi, about 40 miles south of Tete—he discovered rich auriferous white quartz-rocks, embayed in a variety of ancient crystalline rocks, whether hard slates (probably Silurian) or various igneous rocks, including a great predominance of granite and diorite. The loftiest part of this elevated tract being 7000 feet above the sea, and lying in s. lat. 19° 50′ and E. long. 28° 35′, presents in parts great accumulations of these broken masses of granite, to which my illustrious friend the late Leopold von Buch assigned the appropriate name of "Felsen Meer," or a sea of rocks. Many travellers have too often erroneously considered these to be boulders, whilst in fact they are simply the results of decomposition *in situ*, as seen in many granitic countries.

The auriferous quartz-rock, which in places is still seen to rise a few feet above the surface, has, where rich in gold, been quarried down in open trenches to the depth of 6 feet or more. These works seem to have been abandoned simply from the influx of water, and in one spot the traveller detected the remains of smelting operations with slag and scoriæ, the relics of lead-ore being also observable.

Of the auriferous localities described by Mr. Mauch, that which lies to the north, on a tributary of the Zambesi, is the most sterile, and this fact explains why the Portuguese have never made much of it; Dr. Livingstone having only spoken of small quantities of gold-dust being washed down in the rivers to the south of Tete.

On the other hand, the existence of the rich tract on the river Thuti, or Tuti, an affluent of the Limpopo, and the proof of old works having been in operation there, greatly favours the suggestion I am about to offer that the Ophir of Solomon was probably near the mouth of that great stream. In the mean time the discoveries of Mr. Mauch have awakened the interest of many of the colonists of bert, to fit out an expedition to enter the Arctic Seas by Behring Strait; and, finally, we have once more been stimulated by Sherard Osborn to go forward in the cause he has so much at heart. Whilst in his last communication he gave many strong and good reasons for preferring, as heretofore, the route by Smith Sound to any other line, he is, I know, above all desirous that we should lie no longer on our oars, but that, at the latest in the ensuing year, whichever route may be preferred, something should be done in reopening this fine school for the training of hardy and adventurous seamen.

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* In the original map of Mr. Mauch, which Dr. Petermann has submitted to my inspection, a third and intermediate gold tract is laid down.

In his last Memoir, Captain Sherard Osborn gives great credit to the views of Dr. Petermann, who has indeed justly entitled himself to our warmest acknowledgments for the sagacity and talent with which he long ago deduced the existence of those northern lands, and laid them down in his maps from the evidence of the Russian explorers, and recently again examined by way of Behring Strait. At the same time the results of the inquiries of the Swedish expedition at and around Spitzbergen are, as Osborn thinks, antagonistic to the success of any effort in that direction.

Whilst such are the preparations and hopes in European countries, a great amount of fresh knowledge has been obtained by our American kinsmen, who in their whaling-vessels have pushed their enterprise through Behring Strait, far beyond the land first sighted by Kellett, and beyond 73° N. lat. have coasted extensive high lands which lie off the coast of Siberia, from which they are, it is thought, separated by the sea first seen by Wrangell. These, indeed, are great advances since the days when Collinson (whose discoveries in another direction have never been surpassed) determined the outline of the whole northern coast of America, and Kellett first saw Herald Island.

One of these masters of American whalers—Captain Long—has communicated to the 'Pacific Commercial Advertiser of Honolulu,' a report which, in giving a lively sketch of the progress of Arctic discovery from the days of Hudson and Frobisher, has enunciated the opinion that, if ever a transit by water be made between the Eastern and Western Oceans, it will not be by lines hitherto tried, but by an enterprise directed from Behring Strait.

Looking to the fact that the Arctic Sea is bounded by North America, Greenland, Spitzbergen, Nova Zembla, and Siberia, and that it is the recipient of the enormous bodies of water poured into it by many large rivers, he infers that the surplus must be mainly discharged either by Spitzbergen or by Smith Sound and Baffin's Bay. Now, all navigators who have endeavoured to get towards the Pole by these lines have, he says, always met with a powerful outflow of water transporting and moving out the ice southward into the Atlantic. Thus it was that Parry, having proceeded with great perseverance in sledges 292 miles northwards, and having reached lat. 82° 45′, was only 172 miles from his starting-point, so steadily had the broken ice been carrying him and his party southwards by this great channel. Considering that the same outflow of water and ice has been met with by all explorers to the north of Smith Sound, Captain Long maintains that Behring Strait stands in favourable contrast to the other openings into the region of the Polar Sea, and is the channel in which the effort should be made. He affirms, from experience of whalers since 1847, that no great body of water finds its way south through Behring Strait; and that, at least in the spring and summer, the current is always found setting to the north, owing, as he infers, to the discharge of the rivers on the North American shore and that of the Anadyr on the Asiatic coast. He suggests, therefore, that a strong vessel of from 200 to 300 tons' burthen, and provided with sufficient steam-power to get through temporary obstacles, should follow the Asiatic shore from Behring Strait as far as Cape Kekurnai or Cape Schelagskoi. From some point between those capes the course would be to the north of the Laachoo Islands, whence the course towards Spitzbergen or the Pole would be influenced by the currents proceeding from the great Siberian rivers. If the vessel were obstructed by ice to the north of these islands, the outflow current, though not so strong as immediately to the north of Spitzbergen or in Baffin's Bay, would, he thinks, eventually carry the ship through one of the channels into the Atlantic.

Another route by which the voyage might, in the opinion of Captain Long, be accomplished, is to proceed from Behring Strait to the mouth of the Lena, then directly north beyond Cape Sievero Vostoschni, and then westwards towards Spitzbergen.

The letter of this experienced whaling captain is highly entitled to the notice of all persons interested in Arctic exploration, inasmuch as he assigns strong grounds for believing that hitherto we have been toiling like Sisyphus against natural obstacles; he believes that notwithstanding a few minor difficulties on the Siberian coast, if we once get a stout but small vessel into the current caused by the Yenissei and other great Siberian streams, that she would,

if entangled in the pack, be unquestionably carried forward into the Atlantic.

Captain Long concludes that the passage from the Pacific to the Atlantic Ocean will eventually be accomplished from Behring Strait by one of the two routes which he has indicated, and adds, "I have as much faith in this as I have in any uncertain future event, and much more than I had fifteen years ago in the Atlantic telegraph."

Irrespective, however, of this possible but useless transit from the Pacific to the Atlantic, a fourth plan by which the North Pole may be reached has been recently brought under my notice by an experienced captain of a British whaler, David Gray, and which he thinks has many advantages over the three routes by Smith Sound, Spitzbergen, or Behring Strait. Writing to me on the eve of his departure for his usual fishing-station, off the east coast of Greenland, he maintains from his long observations of the tides, the set of the currents, and the state of the ice in that region at various seasons of the year, that there will be little difficulty in carrying a vessel in *a single season to a very high latitude, if not to the Pole itself.* He proposes to take the ice at about 72°, where there is a deep bight running towards Shannon Island, and thence he could follow the continent of Greenland as long as it trended in the desired direction, and afterwards push through the loose fields of ice, which can be easily penetrated, as proved by Scoresby, Clavering, and Sabine.

This project is supported by numerous good observations; among which the rarity of icebergs in those wide seas, probably affected by the warmth of the Gulf Stream, in comparison with their abundance in the narrow strait of Smith Sound, would seem to give to his route a decided advantage over that on the west coast of Greenland. Another advantage is, that the ice on the east coast is field or floe ice, which is always in motion even in winter, as proved by ships that were beset as far north as 78°, being driven down during winter and autumn to Cape Farewell. Adducing other reasons for preferring this route, Captain David Gray believes that an expedition might reach Shannon Island in fourteen days, and would be in its field of operation six weeks sooner than if it were sent to Smith Sound; and therefore that a vessel sailing in June would have before it for research the greater part of July, all August, and the half of September, in which time the object might be accomplished. Failing of this, and it being necessary to winter, there are, it is

said, many bays and good harbours on the east coast of Greenland which are available, where, according to the indications observed, there seems to exist an average amount of animal life compared with other Arctic districts. I refer you to Captain David Gray's sensible letter on this subject, which will be published in our 'Proceedings;' and in the mean time it is highly gratifying to know that the German, or, as it may be truly called, the Petermann Expedition, which is to sail to-day from Bergen, is about to proceed on the same line as that advocated by the experienced whaling commander Captain David Gray.

Before I dismiss the subject of Arctic researches I must state that I have recently been informed by Professor A. E. Nordenskiold, of Stockholm, that the Swedish Government are preparing to make, during the approaching summer, an attempt to advance into the Polar Sea beyond Spitzbergen. A powerful screw-steamer, expressly built for winter navigation, has been granted for the purpose, and is to be provisioned for twelve months. Already the Swedish Government have gained honour by their encouragement of successive expeditions to Spitzbergen for the measurement of an arc of the meridian, and the scientific exploration of the islands, in which Professor Nordenskiold took part; that success may attend the present enterprise must be the prayer of all Geographers.

BRITISH NORTH AMERICA.—In an able review of the Memoir read by Mr. Alfred Waddington, during the present session, "On the Physical Geography of British Columbia," Dr. Cheadle has recently given[*] us a very suggestive forecast of the probable future of our North American Colonies, if those on the Pacific, so rich in coal and gold, be not speedily connected with those east of the Rocky Mountains and with Canada. Coming from the fellow-traveller of Lord Milton, who three years ago called public attention to the important subject of a north-west passage by land, I am happy to see Dr. Cheadle coincides with me in assigning great praise to Mr. Waddington, for the perseverance and intelligence with which he has promoted, at great pecuniary sacrifice, the exploration of British Columbia during many years, and for having been the first to indicate the best line of route between the Leatherhead Pass of the Rocky Mountains (described by Dr. Rae, Lord Milton and Dr. Cheadle), and Bute Inlet on the Pacific. It is manifest that the

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[*] 'Pall Mall Gazette,' April 15, 1868, p. 3.

I offered to them of employing a certain number of men of science as attendants upon the military expedition about to proceed; and you also know that, whilst the greater number of the gentlemen so employed accompanied the force from India, our Secretary Mr. Clements Markham went from England, as the Geographer of the Expedition.

Confined as the advance of the British army has been to the long and lofty mountain range which forms the eastern boundary of the Abyssinian plateau, geographers must still take much interest in that range in itself, seeing that it is the dominant and leading feature of the whole region, in being the "*divortia aquarum*" between the Nile and the Mediterranean on the one hand and the Red Sea and the Indian Ocean on the other.

Ever with the advanced guard, and stationed for some time at Senafé before the general forward movement took place, Mr. Markham has been enabled to make many good observations on latitudes and longitudes, the heights of the mountains and plateaus, and the character of the rocks. He has also given us, in two memoirs which have been read to the Society, striking descriptions of the meteorology and natural scenery, as well as of the changes of vegetation at each varying altitude, in these highly-diversified highlands. A third memoir has been received, and a fourth is promised when the description of the country up to Magdala shall have been completed, and in this he will describe his entrance into Magdala with the storming party, as I know by a letter he has written to me on his gallop homewards. Even on that eventful day the Geographer was at work, for he took two observations for latitude on the heights of Magdala.

I have no hesitation in saying that, when they are put together, these memoirs of Mr. Markham will form as creditable a portion of the 'Journal' of the Society as it has ever contained; and I therefore feel satisfied that I did well in strongly recommending him to the Secretary for India as one well qualified to be the Geographer of the Abyssinian Expedition.*

During the progress of this great enterprise, the various departments of the public service and public institutions have been well supplied with the best and most recent geographical information of this country by the Topographical Department of the War Office, which has issued at intervals successive editions of the route-map and other maps of Abyssinia. The chief credit of this is due to the promptitude and intelligence of Colonel A. C. Cooke, under whose direct superintendence the maps, as well as the publication entitled 'Routes in Abyssinia,' and many engravings of scenery, have been compiled.

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* Whilst these sheets are passing through the press, our meeting of the 8th of June has taken place, and the Fellows have heard from Mr. Markham himself—happily returned from his honourable and successful mission—the interesting account of the line of march from Antalo southwards, and the Topography of Magdala.

Sympathising as I do with an eloquent writer in a recent number of an able periodical* in the astonishment he expresses at the apathy with which many of our countrymen regard this expedition, I ask with him, When has Europe marched a scientifically-organised army into an unknown intertropical region, and urged it forward as we have done, for hundreds of miles over chain after chain of Alps amid the grandest scenery? and all to punish a dark king, of whom we only know that he was an able but unscrupulous tyrant who insulted us by unjustly imprisoning our countrymen. This truly is a fine moral lesson which we have read to the world; and as, in addition, we reap good scientific data, the Abyssinian Expedition will be chronicled in the pages of history as more worthy of an admiring posterity than many a campaign in which greater political results have been obtained, after much bloodshed, but without the smallest addition to human knowledge. I may add the expression of my delight that the distinguished General who has accomplished these glorious results is a man of science, and is particularly well versed in Geography.

DEPENDENCE OF GEOGRAPHY ON GEOLOGY.—*The oldest Comparative Geography.*—Having now touched upon some of the chief advances made by Geographers during the past year, I may briefly direct your attention to those subterranean phenomena by which the present outlines of sea and land have been mainly determined, and ask you not to rest satisfied with merely exploring and describing distant and unknown countries, or in fixing latitudes and longitudes. I would incite you to increase the pleasure of your studies by endeavouring to trace, from ages long anterior to the creation of man, the various changes which the surface has undergone before the present contours of land and water were attained, and to ascertain by what natural agencies such outlines have been successively brought about. If it be said that this is entering into purely geological questions, my answer is, that, as a weather-beaten explorer of the rocks, it is my pleasing duty to revert to my old love, and to stimulate you to ponder on the grand series of pre-historic events by which the present relations of land and sea have been realised.

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* 'Spectator,' April 18, 1868, p. 456.

Possessing no distinct evidence to show us what were the earliest conditions of the planet, whilst (according to general belief) it was passing from a molten mass into a solid spheroid, and seeing that, at the beginning of the geological record, we are as much lost in obscurity as the astronomer who peers into the remotest nebulæ, the geologist explains to us, after fair search and inquiry, what were for the most part the aqueous, if not the hydrographical, conditions at the time when the oldest strata were deposited. He has so worked out the order in which the stony tablets forming the crust of the earth lie upon each other, containing within them the records of the earliest as well as of all succeeding living things, that he has at last developed the history of former life, from that beginning when only the lowest invertebrate creatures lived in the sea, and were buried in the first-formed marine sediments, through an ascending order of creations, until the human period was attained.

Leaving these records of successive creations to the palæontologist, the physical geographer may unite with the geologist in the endeavour to elucidate the changes of the surface, as due to each great perturbation which the crust of the earth has undergone. In short, the ups and downs of the geologist are the fundamental data on which our present geographical features mainly depend.

It has been ascertained that life was first breathed into the waters in the form of marine invertebrate creatures of the lowest class called Foraminifera. We have learned, indeed, that the mud and sediment of those earliest seas, in which only such animals (and probably seaweeds) lived, were subsequently transformed into those crystalline gneissic rocks which constitute the basement of the Laurentian system of North America and the fundamental gneiss of North Britain and Bohemia.

The succeeding period, as proved by fossil remains in the lower stages of the Silurian rocks, was one in which a variety of marine animals, *i.e.* of shell-fish, crustaceans, and mollusks, began to abound, though these invertebrates are wholly dissimilar in species from any known in the present era.

During all these long early periods we have scarcely any proofs of the existence of lands; and, though some terra firma must have existed to afford materials for the accumulations of the sea-beds, we have every reason to believe that there were then no lofty mountains. In other words, it is supposed that the seas then occupied enormously wide spaces, and also that a much more uniform temperature and climate prevailed in both hemispheres than at present, judging from the fact that the fossil remains found in these ancient strata have a common *facies*, though found in regions widely remote from each other.

For a very long time, then, we may infer that, in the absence of high lands, nothing approaching to the present physical outlines of the surface existed. As time rolled on, this ancient fauna was largely increased by the creation of many new marine animals; but during all the immensely long older Silurian era the seas were unoccupied by a single fish, or, in other words, by any animal having a vertebrate column or backbone. The first fishes suddenly appeared towards the close of the long Silurian epoch,* and, judging from the structure of the deposits, this particular period was one of long-continued quiescence. And yet this earliest kind of vertebrate animal, whose bones assure us that it is the prototype of the human skeleton, is distinct from and unconnected with all the other marine animals which lived before and with it. Thus, these first fishes are as clear a manifestation of creative power as any of those other proofs which are offered to us, as we mount up through the overlying formations, and continue our inquiry until we reach the recent superficial deposits.

It was at about the period when fishes appeared that we have the first proofs of the existence of dry lands, in the remnants of some curious land-plants; and then, indeed, it is clear that the earth's outline was becoming more diversified. But still we are without evidence that any great rivers then flowed from mountains. In the mean time, however, various outbursts of igneous rocks, whether porphyries, greenstones, basalts, &c., had been penetrating the surface, and had therefore added much to the materials out of which all marine deposits might be formed; doubtless these operations considerably changed the outline, and thus began the first approaches towards the present features of the earth, and the diversified relations of land and water.

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* See 'Siluria,' 4th Edition, p. 477.

In subsequent ages fresh accumulations were added to the crust of the globe, and, in tracing these upwards, the geologist has demonstrated that he meets successively with races of higher organisation; so that, having passed through the successive additions of lizards and warm-blooded quadrupeds to all that pre-existed, he finds relics of the human race in the uppermost of all these accumulations, and lying above those of all other kinds of animals. During this incalculably long time the face of the globe underwent numberless changes, most of which were due either to contractions of the crust, or to the expansion of internal heat and gases, producing great folds, crumplings, downcasts, and breaks in the outer layers of the earth. In some regions the strata, raised from sea-bottoms into lands and hills, were by that action of internal heat folded over into a multitude of convolutions. Occasionally these folds were broken athwart, leaving the great solutions of their continuity which are called faults.

Now, whether by such convolutions, or by the more complex action of innumerable fractures, such deposits were affected, I maintain that they then had impressed upon them certain great outlines, which, much as they have been since modified by atmospheric and diurnal action, still constitute in many tracts the chief drainage lines of the several continents and islands which geographers have to examine. In estimating the various perturbations of terrestrial masses, whether by upheaval or depression, of which geology affords evidence from the earliest period up to historic days, my belief is, that to one or other of these movements we can in many cases trace the *origin* of those valleys, deep lakes, gorges, and river-courses, which it is the province of the geographer to describe.

In illustration of these views, I may say that there are many mountain tracts, such as the Central Highlands of Scotland, large parts of Scandinavia, and the Ural Mountains, in which there is clear evidence that rocks of very high antiquity occupied their relative positions, and had deep depressions across them, at the times when such main outlines were originally determined. I believe, that in many cases the watercourses which still flow in the valleys took their direction then, and have ever since continued to act; necessarily deepening their beds in the highly inclined or mountainous parts, whilst encumbering the lower countries with their *débris* and silt.

Hence I infer that there are regions in which these old and pristine depressions have remained to this day as the prominent features which determined, and still maintain,* the main lines along which atmospheric action, snow, and ice, and water, would necessarily exert the greatest influence in eroding the rocks.

There are, however, many tracts, such as parts of England, wherein great masses of secondary and tertiary rocks have been successively accumulated, and have covered over the ancient rocks; and in such districts the aboriginal lines impressed upon the older rocks have been hidden. The Alps—particularly the Western Alps—afford illustrations of both these phenomena; for there we can see tracts where the old rocks exhibit the original features of elevation, fracture, depression, and convolution; whilst, in other parts, we note how such pristine features have been obscured by the subsequent accumulation of younger deposits. Again, we have in that chain the clearest proof that it underwent great upheavals by one of the very latest geological movements, at which time some of the youngest formations on its flanks were raised into the highest pinnacles of the chain, having often undergone such intense metamorphism that the latest of them have assumed the mineral aspect of the oldest rocks. Yet through all this chaotic assemblage the skilful geologist can often trace to one or other of the great movements which the masses have undergone the dominant causes which have led to the existing drainage of these mountains.

True it is that glaciers and melting snows have through long ages widened gorges and ravines, and have worn away large portions of the mountain sides, but they have not, in my opinion, really originated the great valleys in and along which the glaciers have advanced.

Looking at the surface of the globe in this aspect, the geologist is but the physical geographer of former periods, and he ascertains beyond all doubt that, when the tertiary periods were completed, and long anterior to the creation of man, the hills and valleys of all continents and islands had, to a very great extent, assumed their present outlines—such outlines having been mainly due to subterranean action, followed at intervals by powerful denudations.

Having laboured through many a year in the endeavour to establish certain well-known land, sea, and river marks, in geological science, I have made these observations to incite all travellers never to neglect the observation of these ancient phenomena, upon which the basis of physical geography rests. By connecting them further with the various proofs of the eruption of those igneous rocks which form such a large portion of our subsoil, they will in all their excursions have an additional stimulus to look to the foundations of our science; and, if imbued with the love of nature, they may, like the illustrious Humboldt, combine such knowledge of the earth on which they tread with all the existing wonders of animal and vegetable life which characterize its various zones of altitude and climate.

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* This view has been ably sustained by the Duke of Argyll, as regards the Argyllshire highlands, in a masterly memoir, recently read before the Geological Society of London.

LIVINGSTONE'S PROGRESS IN SOUTH AFRICA.—Glorious indeed have been the tidings which we have received since the last Anniversary, in relation to the great South African traveller. It was then my duty to recapitulate my reasons for the utter disbelief I entertained of the truth of the story of his death, so generally believed, and I added other indications to prove the falsehood of the Johanna men. I also dwelt with satisfaction and gratitude on the support which Her Majesty's Government had afforded to the Council and myself in sending out a boat expedition by the Zambesi and Shiré rivers to the Lake Nyassa, to ascertain the truth. Rejoiced indeed did I feel when that expedition returned precisely at the time calculated, bearing the joyful intelligence, that not only had Livingstone not been killed at or near to Lake Nyassa, but that, accompanied by his nine trusty negroes (six of them christianised lads from Nassick near Bombay), he had passed on for many days' march into the interior. My anticipations as to the falsehood of the Johanna men having been thus realised, I felt certain that, if his usually robust health continued, we should not be long without obtaining that intelligence from himself which has since come, and filled the country with gladness.

Few can realise the anxiety I felt until the gallant and skilful Mr. E. D. Young brought us the first happy news; for I well knew how many chances of failure hung in suspense over that expedition. The boat was constructed of thirty-eight pieces of elastic steel, which had to be put together and taken to pieces three times after it reached the mouth of the Zambesi; to be carried past the great rapids and falls of the Shiré for 40 miles on the backs of negroes; again broken up on returning, and again put together to descend the Zambesi, where the party were to be picked up by a cruising ship of war at a time duly calculated! Pondering on all these chances, I was too well aware that, if through any accident—such as the loss or fracture of a single piece of the steel boat, the insubordination of the black crews which were to man the boats, the sickness of any one of the party—the expedition returned without results, that I should have incurred much blame, and the scheme would have been stigmatised as the Utopian Livingstone Search. Through the admirable conduct, however, of Mr. Young and his associates, the truth was ascertained; and from that moment I had not the smallest misgiving as to the future travels of my dear friend in the interior.

Not dwelling on what Livingstone has already accomplished, for his letters have recently been laid before you, we may now speculate on his future steps, and if we form a right estimation of the course he is now following out, we may not unreasonably calculate the period of his return home. At the date of his last letters,—2nd February, 1867,—the great traveller was at Bemba, lat. 10° 10′ s.; and at that time all the problems respecting the outflow or inflow of the great Lake Tanganyika, about 200 miles to the north of his position, had yet to be determined. He had, indeed, to ascertain whether that vast body of fresh water, about 300 miles in length, and the central part of which only was known to Burton and Speke, was fed by waters flowing into it at its southern end, or sent off a river or rivers to the south-west. Now, this point, I have no doubt, he will have completely ascertained; for as by the last accounts brought by the Arabs he was at Ujiji, which lies in the central part of the eastern shore of Tanganyika, in the middle of October, so we know that he had eight months to settle that important question.

If it should transpire that he found no outflow to the south-west (and we know that there is nothing of the sort to the east), then the great mass of fresh water must have an outlet either to the west at a more northern parallel, or there must be an opening in the mountains at its northern extremity, by which the waters of the Tanganyika flow into those of the Albert Nyanza of Baker. If the first of these hypotheses prove true, and, the Tanganyika being found shut in on the north, a great stream should be discovered flowing from it to the west or south-west, why then my dauntless friend may follow that course of water across an entirely unknown region of Africa, and emerge on the west coast either by the settlements on the Congo* or by the territory of the Portuguese, to which he penetrated in his first grand travels across South Africa. In this case a very long time, perhaps eighteen months, may elapse, during which we shall be held in anxious suspense.

On the other hand, if the view of Mr. Findlay be sustained,—that a water-communication exists between Tanganyika and Albert Nyanza,—we can much more readily estimate the probable period of his return. In this event, the great physical problem of the true watershed of South Africa and the ultimate southern water-basin of the Nile will have been determined; and in touching the south end of the Lake Albert Nyanza, Livingstone will have, in fact, reached the known waters of the Nile.

If such be the case, opinions are various as to the course he would next follow: some persons believing that he would push on northwards, and, traversing Equatorial Africa, would endeavour to reach Gondokoro, and so descend the Nile to its mouth. For my own part, I have already expressed the opinion that, having once determined the great gegraphical problem which he went out to solve, it is more probable that he would turn to the east coast and find his way to Zanzibar, by a route to the north of that traversed by Burton and Speke. Should such have been his decision, there is nothing unreasonable in the hope of seeing him home in the autumn. If, however, he should be led, through his unrivalled intrepidity and self-confidence, to navigate the huge long sheet of water the Albert Nyanza, and thence endeavour to reach Gondokoro and descend the Nile to its mouth, I give you the following estimate of Sir Samuel Baker, as prepared at my request:—

"If Livingstone," says Sir Samuel, "were to reach the north end of the Lake Tanganyika by the end of November, he would have fine weather until the 15th February, and might reach the south end of the Albert Nyanza by the end of December; and, if all went well and canoes were obtained, he might reach Magungo or the

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* According to the map of Duarte Lopez, published in 1591, in Pigafetta's 'History of Congo,' and copied by many of the atlas makers of the sixteenth and seventeenth centuries, the Congo River flowed out of a great lake in Central Africa, corresponding pretty well in position with Lake Tanganyika. Lopez gleaned his information during his residence on the Congo from 1578 to 1587. See Mr. R. H. Major's Paper on Pigafetta's map of Africa, in our 'Proceedings,' vol. xi. p. 246. My attention has been recently again called to this subject of the equatorial lakes, as represented in the old atlases, by the Rev. P. H. Waddell of Glasgow, who has described to me a map of this kind given in a miniature Italian atlas of the sixteenth century.

Nile junction in one month, or by the 1st of February. Now, if the Arabs should have established a depôt since I left Magungo, they would receive him. The Arab traders quit their depôts annually in March, to deliver their ivory, &c.; and if the traveller should arrive among them before the 15th March, they would take him on to Gondokoro. All the boats that descend the Nile leave Gondokoro for Khartum at latest on the 15th April, and if the Arabs receive Livingstone before that time, they will bring him to Khartum about the end of May. The post from Khartum reaches Alexandria in about twenty-five days, and therefore if the great traveller should have to keep this line and reach Gondokoro and Khartum, we should hear from himself by the end of June, if he is to appear this year *viâ* the Nile. In that case he might be in England in August. On the other hand, if, having taken this line, Livingstone misses the Arabs, he will have the greatest difficulty in reaching Gondokoro; and again, if he should not attain that part till after April, there will be no boats to bring him down the Nile to Khartum before April, 1869.

"It is impossible," Sir Samuel adds, "to foresee the difficulties that may occur between the north limit of Tanganyika and the nearest Arab station; but should all go smoothly (which is seldom the case in Africa), it is possible, but not probable, that he might reach Gondokoro in April, 1868. Since I left, three years ago, the Arabs may have extended their journeys far south, and if so, they will materially assist Livingstone and save him from the annoyance and delays that we suffered in Kamrasi's country."

In anticipation of news from Livingstone himself, I have thus put his case before the Society, according as he may follow one of the three routes I have indicated; and my hearers must see that much doubt must attach to the adoption of any decided conclusion as to the period of his return to England; for, even if he should attempt to return by the Nile, we see, from Sir Samuel Baker's explanations, how many fortunate contingencies must combine to enable him to reach England soon. But whether, after determining the true watershed of South Africa, he should emerge by Zanzibar or by the mouth of the Nile, or deflecting from either of those courses, for the reason above assigned, he should reach the Congo or the Portuguese settlements on the west, Livingstone will have so vastly added to his fame, that he must unquestionably be pronounced the greatest of all African explorers. In any case, I trust that, looking to his long and devoted services, and that he has been acting as her Majesty's Consul and accredited as such to all the Chiefs of the Interior of Africa, the Government will think it due to so illustrious a traveller, so zealous a missionary, and so faithful a servant, to grant him an adequate pension for life, as well as some suitable honour of the Crown.

CONCLUSION.—Reverting, Gentlemen, in conclusion, to the expressions I used in commencing the Address, on the very prosperous condition of our Society, and returning you my heartiest thanks for the kind continuance of the support you have invariably afforded me in my endeavours to do my duty, I must repeat what I have said on former occasions, that you should have selected a younger man to fill the distinguished post which I have so long occupied.

Since, however, you are pleased to keep me in office during another year, I can honestly say that I am as warmly devoted to your cause as ever; and that, notwithstanding my advancing years, I will still strive to be worthy of the confidence you continue to repose in your veteran leader.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED OCTOBER 3RD, 1868.]

SESSION 1867-8.

Thirteenth Meeting, 8*th June*, 1868.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*Robert Michell, Esq.; G. W. Nicol, Esq.; P. J. Rowlands, Esq.*

ELECTIONS.—*William A. Bell, Esq.*, B.A., M.B., Camb.; *A. T. Bowser, Esq.; William Clark, Esq.; The Hon. George Stephen Gough; Thomas C. Graham, Esq.; Sir George Philip Lee, Bart.; His Excellency Lieut.-Gen. Sir Robert Napier*, G.C.B., &c.; *George F. Plumberg, Esq.; Charles J. Smith, Esq.; Capt. the Hon. William John Ward*, R.N.; *Michael Williams, Esq.*

ACCESSIONS TO THE LIBRARY from MAY 11TH to JUNE 8TH, 1868:—'Physical, Historical, and Military Geography.' From the French of Lavallé, edited by Capt. Lendy. Donor, Mr. E. Stanford. 'Peruvian Reports on Rivers Ucayali, Pachitea,' &c. Presented by Don M. Paz Soldan. Orme's 'History of Indostan.' Purchased. 'Political Missions to Bootan.' Purchased. Lacaille's 'Connaissance de Madagascar, 1862.' Donor, Rev. J. Holding. 'Loss of the *Winterton* East Indiaman on the Coast of Madagascar, 1792.' Donor, Rev. J. Holding. 'Afrikanische Reisen,' von Gerhard Rohlfs. 1868. Presented by the author. Cuningham's 'Buddhist Monument.' 1854. Purchased. Darwin's 'Volcanic Islands.' 1844. Purchased. Dr. A. Petermann's 'Deutsche Nordpol Expedition.' 1868. Donor, the author. G. Bocardo's 'Fisica del Globo.' Genova, 1868. Donor, the President. 'Port Said.' Letter by Comm. A. Cialdi. Donor, the author. A collection of pamphlets bound, 1791, &c. Donor,

R. Biggs, Esq. 'Lettere sulla Tunisia, sulle Province di Susa, e Montasir.' R. A. Wilson's 'History of the Conquest of Mexico.' 1859. Purchased. Faidherbe's 'Recherches anthropologiques sur les Tombeaux Megalithiques de Koknia.' 1868. Donor, the author. G. Marsh's 'Physical Geography.' 1864. Purchased. F. Millingen's 'La Turquie sous la Règne d'Abdul Aziz, 1862-1867.' Donor, the author. Street's 'Indian and Colonial Directory, 1867-8.' Donor, the author. J. Chapman's 'Travels in South Africa.' 1868. Purchased. A. Forster's 'South Australia, 1866.' Presented. L. Agassiz' 'Journey in Brazil.' 1868. Purchased.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF MAY 11TH, 1868.—A Map of the Arctic and Antarctic Regions, showing the Discoveries up to the present date, and the proposed German exploration from Bergen, in Norway, to Sabine Island, in North-eastern Greenland. Presented by Dr. A. Petermann. Diagram showing the change of temperature and atmospheric pressure in various parts of Switzerland during the years 1863-5 and 1867. Presented by Professor J. M. Zeigler. Four sheets of the Geological Map of Sweden, viz., Eriksberg, Nyköping, Tärna, Sämsholm, with four books of letter-press. A small Map of India in 1868. Presented by E. Weller, Esq. Map showing the Route of the Pundit in Tibet under the direction of Capt. T. G. Montgomerie. Presented by Dr. A. Petermann. A view of Magdala, from a sketch by Th. von Heuglin. Presented by the War-Office, Pall Mall, through Sir E. Lugard. A Map to accompany Gerhard Rohlfs' 'Narrative of his Last Journey.' Presented by Dr. A. Petermann. A bark canoe from Tierra del Fuego, with paddles, fishing-gear, and baling-buckets. Presented by William Robinson, Esq., Governor of the Falkland Islands.

The following Papers were read :—

1. *On a Project for the Scientific Exploration of Central Australia.*

By DR. G. NEUMAYER.

AFTER an historical introduction, giving an account of the progress of discovery and exploration in Australia, and showing what great influence the difference in the physical character of the north-west and south-east coasts exerted on the occupation of the continent by Europeans, the author proceeded to say that :—

Soon after the discovery of gold in the east and south-east, our knowledge of the interior of Australia became very much enlarged, it having become imperative to look for fresh pasture-ground. The farther inquiry was pushed towards the north and towards the interior, the farther receded the once so much dreaded desert. Scientific inquiry had already anticipated the result of actual exploration; inasmuch as meteorological and geological facts, derived from observations in the colonies surrounding the interior, spoke very strongly against the desert doctrine, which at last, through the glorious achievements of Burke and Wills in the east, and of Stuart in the centre of the continent, was proved to be fallacious. What was once regarded to be the main character of the whole country was now demonstrated to belong only to belts and strips of land lying amidst tracts of fine country, with thousands of square miles well adapted for pastoral purposes.

Although since 1862 the eastern portion of the continent, near M'Kinlay's and Landsborough's tracks, has several times been crossed and recrossed, nothing has been added to our scientific knowledge of the country thus opened out; the question as to its capabilities having been but very slightly examined, and even of the fate of Dr. Leichhardt we remained as ignorant as ever. To the unprejudiced mind it was apparent that these shortcomings were mainly attributable to a want of system in the exploration of the interior, and of conjoint action on the part of the Colonies which at various times have entered on explorations of this nature. Had the same amount of money, daring, and energy been expended on an uniform system of exploration, there could be little doubt that our knowledge would have been considerably more accurate than it is at present.

A glance at the map shows us that an immense tract of land is entirely unknown. Indeed, we might describe a circle in the portion lying to the west of Stuart's track, enclosing an area of half a million of square miles, of which our knowledge is absolutely *nil*. We should form a more adequate estimate of this fact, if we considered that this is at the same time the greatest absolute blank on the face of the globe,—the polar regions excepted; as we know more even of that great tract of country on the African continent which lies south of the equator and near the western coast. This "Terra Australiensis incognita" is somewhat less than one-fifth of the entire continent, and forms the western slope of what we are justified — according to all appearances — in terming the Great Interior Basin.

The northern limit of this basin has been approximately determined by the observations of Stuart, Gregory, Landsborough, M'Intyre, and Walker; and may be roughly indicated by a line running from 18° s. in the north-west to 22° s. in the north-east. In 25° s. and 147° E., we meet the watershed of the rivers flowing to the interior and those flowing to the Indian Ocean,—Warrego, Darling, Murray. From Mr. F. Gregory's explorations in the west and north-west, it seems probable that the dividing range, which has never been crossed in that quarter, runs at a distance from the coast of from 200 to 300 miles and upwards. Now, if we determine the centre of the continent exactly (the point in which the whole mass of land, irrespective of elevation, may be regarded as concentrated), we find its position to be in 26° s. latitude, and 134° E. longitude; and if we farther describe round this point an ellipse, of which half the minor axis is equal to the approximate distance of the centre from the watershed on Stuart's track (510 miles) on the meridian, and half the major axis equal to the distance from the centre to the dividing range between the Barcoo and Warrego rivers (900 miles) on the parallel of latitude, we shall mark off approximately the limits of the interior basin. It is of considerable interest to note, as far as known, the elevations along this elliptical line. In the far west, at the extreme end of the longer axis, the sandstone table-land appears to attain an average elevation of from 2000 to 3000 feet, with peaks of trap-rock and granite rising to 4000 feet and more. Near the head of the Victoria of Gregory the dividing ranges appear to be 1300 feet high, and on M'Intyre's route 1500 feet, with occasional elevations of 1800 feet; their height above the surrounding country being not more than 200 or 300 feet. On Walker's track the watershed sinks to 1000 feet; whilst near the head of the Barcoo (Happy Valley) we know it to be 1658 feet. In the south-east, near Mount Murchison, it passes across ranges of 2000 feet elevation; whilst in the south-west, in latitude 30° s., it is from 1000 to 1400 feet; but then rapidly descends to the ocean, and, after disappearing in the great Australian bight, emerges again, and crosses the Eyria Peninsula, in parts 2000 feet high. In the latter instance our elliptical arc divides the waters draining to the ocean and those to Lake Gairdner; thus, even in this case, limiting the interior basin. The area of the country encircled by the above elevations amounts approximately to one million and a half square miles, and is, therefore, nearly the same as that of the coast river-drainage; the total area of the whole continent being something like three millions of square miles.

Through this immense expense of land M'Dougal Stuart forced his way from Adelaide to the shores of the Van Diemen's Gulf, nearly dividing it into two equal parts. Of the country to the west of his tract, containing our "Terra Australiensis incognita," nothing is known; although since 1860 great efforts have been made to increase our geographical knowledge of the eastern half. Notwithstanding these efforts, even in this portion great areas are entirely unexplored—that between Stuart's and Burke's track to wit.

From the various expeditions made since Burke first crossed the continent, we gather that the watercourses in the interior flow partly towards the south, spreading over immense plains and causing during the rainy season great inundations in the country in 26° s., and between 138° and 141° E. To this fact we must to some extent look for an explanation of the origin of the so-called "Stony Desert" and the barren plains immediately to the north of it, which are shown on our map and formed at one time such a great impediment to the progress of explorers. Whatever of the drainage to the east of Burke's track is not of this character flows into the one great river-system of the eastern interior, the Barcoo (Victoria, Cooper's Creek), which, after a course of 1000 miles, empties itself into Lakes Eyre and Gregory, forming after its bifurcation a large river delta. It is not unreasonable to suppose that in the case of the watercourses in the unknown western parts of the continent a similar state of things must prevail. Probably some extensive drainage finds its outlet into lakes to the north of the Australian Bight, some 200 or 300 miles inland; for the author could not concur in the opinion—though expressed by so high an authority on Australian geography as the Rev. J. E. T. Woods—that Lake Gairdner would ultimately prove to be the main receptacle for the western interior drainage, inasmuch as this lake, if the observations be correct, is close upon 300 feet above the sea, whilst the elevation of Lake Eyre is only 70 feet. Indeed, it is difficult to conceive how, with such an elevation, any extensive reservoir could exist in that locality; and he felt inclined to believe that this large sheet of water, as it appears at present on our maps, would be greatly reduced in size, after a careful survey. It forms, in all probability, only the reservoir for the waters draining from the Gawler Ranges and others in the vicinity.

If the supposition respecting the situation of the main lake in the West should prove to be correct—and there are strong reasons in support of it—then it is equally certain that some long-extended system of watercourses stretches its branches as far towards the interior as longitude 124°, and near the tropic of Capricorn, of which we could not have obtained any knowledge by explorations along the coast. A shorter distance from the receptacle would involve an average fall of drainage far too large to be compatible with the nature of an interior system of drainage; and those explorations leave no doubt that "an intermediate river-system," like that of the Murray in the east, does not exist in the west; on the contrary, from the explorations of Lefroy and others, it is made highly probable that numerous salt lakes of minor extent will be discovered in the whole of the country north of the Bight, which receive the drainage of the south-western portion of the interior basin.

Meteorological phenomena, in so far as they exert any influence with respect to the appearance of a country, such as that with which we have to deal, would, in the opinion of the author, act rather in favour of the country to the west of the continent. The principal feature in the difference of appearance between the seaboards in the north-west and in the south-east, was the great distance to which the high mountain ranges in the north-west recede from the coast when compared with those in the south-east; but though it is obvious that such a difference would have operated, in the first instance, on the discoverer's mind, it is difficult to conceive how it could possibly create such a prejudice against the north-western coast as could not be dispelled by a closer examination. Explorations have to a great extent, indeed, dispelled the preconceived opinions respecting the coast between 20° and 26° s. latitude; and the fine rivers and harbours with which it is now known to abound place it beyond the reach of doubt that these parts also of Australia will participate in the great future which that fine continent is destined to enjoy. Now that it is known that an enterprising squatter succeeded in taking 2200 sheep from the Geraldine Mine on the Murchison, to Nickol Bay, by way of the Upper Gascoyne and the Alma, and that, too, without losing more than eight; and further, that the settlement at Nickol Bay (21° s. and 116° E.) is progressing favourably; any doubts as to the practicability of the north-west coast can no longer be entertained: the less so as, in all probability, mineral resources known to exist near the mouths of the fine streams flowing from the high ranges, described by various explorers, will likewise be found higher up the valleys, and will add materially to the future wealth of the region. Colonisation efforts, however, have of late been mainly directed towards the country round the Gulfs of Carpentaria and Van Diemen, and it has been left to the colony of Western Australia to do the best it could in that quarter. It is not difficult to see that these colonies, separated as they are from their eastern sisters by a vast unknown territory, will have to struggle hard to make any progress: indeed, such progress is scarcely possible unless they extend their territory towards and across the watershed of the interior basin, and unless overland communication be established between them and the other colonies. The author had no doubt whatever that an exploration of that great blank on our map would materially assist, nay establish, such a communication, practicable at all seasons, for the mutual benefit of the colonies, and give thereby a fresh impetus to the spirit of enterprise in the country.

Such an extension of the field of colonisation must have great importance for the interests of the mother country and the British possessions in India. It would tend to secure for the superfluous wealth of the Eastern colonies a new field whereon to expend itself, and from which India could be supplied with Australian products of every description, and that, too, in half the time in which this can now be effected, and across an ocean almost entirely devoid of danger or risk. It is moreover evident that, under certain emergencies with respect to the British dominions in India, emergencies which might arise at any moment, rapid communication and easy access to the dependencies in Australia would prove of the utmost importance, and cannot be estimated too highly. But the north-western coast cannot be successfully colonised without previously exploring that great western territory between Cambridge Gulf and the Australian Bight; and that this might be effected on the base of Stuart's track through the interior, the author hoped to be able to prove hereafter. If, on the one hand, the exploration of the interior be all-important for the complete success of colonisation in Australia, on the other hand it is also eminently calculated to promote the interests of science.

There was now offered an opportunity, such as is rarely to be met with, of furthering in the highest degree the interests of science, in comparison with which the sacrifices necessary on our part sank into utter insignificance. Surely the time had now arrived for us to emulate the bright example set us by that great explorer Flinders by exploring and opening up the interior in a scientific manner, as he explored and opened up the coast-line surrounding it. Scientific skill and research once brought to bear upon our knowledge of this vast interior, and in its very heart, would be sure to reverberate towards the exterior, in producing wealth and prosperity, and in giving a fresh impulse to the efforts of colonisation.

Twenty years ago, on the 3rd of April, 1848, the last news was received in Sydney of Dr. Leichhardt, when on the eve of his departure for the interior on that great expedition from which he was never to return. The professed object of this undertaking was the examination of the interior along the route from Moreton Bay to Swan River, with the special *object of observing the gradual change in vegetable and animal life from one side of the continent to the other*. A glance at the map will show that such a route would pass through the centre of the elliptical-shaped interior basin, and would for this reason, if properly carried out, prove of the highest importance in forming correct ideas respecting its physical geography. We all know, however, that Leichhardt did not make his appearance in the west, that he has never been heard of since the above date, and that all the expeditions in search of him have, up to the present time, failed signally in ascertaining his probable fate. Notwithstanding all the efforts that have been made, we have no further intelligence of him except that he had been at the Alice River, in 24° S. and 145° E.; but of his course from that point, at which he had but just entered the field of exploration, we are in total ignorance.

For reasons contained in part in the explanations just alluded to, and in part detailed at some length in the paper read before the Royal Society, and printed in their 'Proceedings,' the author proposed that such an expedition should proceed from Port Denison, near the Burdekin or the Bowen (20° S. and 148° E.) to a point in 24½° S., on Stuart's track. Along that route it is proposed to establish six depôts in succession, each to be retained only for so long as may be requisite for the examination of the neighbouring country, and for the formation and transport to the following. The distance to be travelled between these two points is 1080 miles, to which fifteen months will be devoted, allowing, even with a very moderate rate of travelling, a stay in each of the depôts of nearly two months. At point B (on the author's map) the depôt is to be fixed somewhere between the Hugh and Fincke rivers; and it is intended to send from this place a party to the nearest settlements in South Australia, partly for the purpose of securing all collections, observations, &c., made up to that time, and partly for the purpose of receiving a fresh supply of stores, and, if necessary, fresh horses and men for the expedition. By the time it will have arrived at that part of the interior, stations will have been pushed forward to the north of Mr. Jarvis's station at Mt. Margaret; but, in any case, such an arrangement will not meet with any great difficulties, so that the expedition will be enabled to make a fresh start from that point through the interior on the basis of Stuart's track. This is of the more importance, as an opportunity will be thereby afforded of receiving any information respecting discoveries which may have been made in the west during the absence of the expedition from the settled districts, and which may materially assist its further movements. In penetrating the entirely unknown country, it is proposed to keep upon the same latitude as far as point C in 125⅔° E., thence to proceed on this meridian to 27° S., and from there to strike out for point D on the banks of the Swan River in 31½° S. and 116¾° E. The total distance on this line is 1569 miles, for which twenty-seven months will be required; and eight depôts will have to be formed approximately in the positions indicated on the map.

So far as known, there is on this route the greatest likelihood of meeting with practicable country,—that is to say, of meeting with no very great difficulties in the progress arising from the character or configuration of the soil and the vegetation with which it may be covered, and that there is every probability of being able to obtain ample supplies of water, grass, game, &c. It is upon these points, indeed, that the author in great measure grounded his hopes of ultimate success, as it was intended, on the present expedition, to avail ourselves, to the greatest possible extent, of the natural resources of the country. These, by the proposed method of procedure, and particularly by the formation of temporary depôts, it was hoped to turn fully to account in a way which would be utterly impossible in passing hurriedly through such a vast extent of unknown country.

The principle of partial self-support once adopted must necessarily influence to a great extent the equipment of an expedition, especially with reference to its stock of provisions. These will mainly have to be selected with a view to supplement, in their nourishing effects, the natural products of the country. This is not the place to enter upon a discussion of the physiological side of this question; suffice it to say that sufficient experience was now collected to enable us to form an accurate estimate of what will be placed at our command in passing through the interior, and to make it most productive of benefit to the explorers.

The object of primary importance is certainly to preserve the party in health and strength, and protect it against the ravages of scurvy and similar diseases. But all the precaution of medical skill would prove ineffectual if measures be not adopted against depression of spirits and the want of mental elasticity. The monotonous character of Australian scenery and the absence of adventurous excitement in Australian travel are both eminently calculated to predispose mind and body to disease. Care should, therefore, be taken to anticipate these deleterious influences by some energetic agency keeping mind and body in continual exercise. As such an agency none was more beneficial, and at the same time more useful, than the employment and participation of every member of the expedition—according to individual capacity—in the execution of the scientific surveys and labours.

Such were the principles on which the expedition was to be organised; some of the leading points in its organisation were as follows:—

(1.) Geographical discovery and scientific survey are the main objects of the proposed expedition.

(2.) All branches of natural science are to be included in the general plan of organisation, so far as this is compatible with the main objects in view.

(3.) The party to consist of twenty-five men, inclusive of seven professional men: leader; assistant-leader; geologist, botanist, and medical officer; zoologist and medical assistant; artist and photographer, and assistant observer.

(4.) For means of transport it is proposed to take fifty horses and ten camels, which latter animals have been acclimatised in the colonies, and show a special fitness and adaptation for Australian exploring work.

(5.) The probable expense of the expedition, extending over a period of three years and a half, is calculated to amount to 21,535*l.*

(6.) All money transactions are to be committed to the hands of a committee of administration, consisting of five members, and residing in the colonies. The members of the expedition are to be considered as salaried officers.

(7.) The results of the expedition,—collections, diaries, maps, &c.,—are, on the completion of the expedition, to be placed in the hands of the committee, to be turned to account in the interests of science and of the various countries which have participated in the undertaking.

Although lines of demarcation had been drawn across the continent from shore to shore, defining the boundaries of the several colonies, it is manifest that such a division, if strictly adhered to in respect to schemes of exploration and scientific research—each of the colonies confining its efforts to its own vast territory, without regard to the remainder of the continent—would so impede the progress of geographical knowledge, that there would be but slender prospect of the speedy attainment of the much-desired information respecting the interior. Moreover, the greater part of the unknown western interior, as well as the northern seaboard, cannot be regarded as included in the boundaries of either of the colonies, so that the mother-country might not unreasonably be expected to take an active part in the exploration. And while, under the circumstances, the proposed method of providing the necessary funds appears to be the fairest possible, the share of the burden falling on each of the several communities is thus reduced to an amount insignificant when compared with the probable results of the undertaking.

The author therefore believed this to be a case in which this Society might very properly exert its powerful influence to aid in bringing about that co-operation which alone can lead to great results, both with regard to the interests of science and to colonisation. The importance of the enterprise, from a purely scientific point of view, was beyond dispute; and he should deem it presumption on his part were he to attempt to bring this part of the subject more prominently before this Society. It was rather on the ground of the extension of our geographical knowledge, with the view of opening up new fields for the spread of civilisation, and successfully completing the colonisation of one of the finest countries on the face of the globe, that he solicited the support of the Royal Geographical Society on the present occasion.

The PRESIDENT explained to the Meeting that Dr. Neumayer was a gentleman distinguished as a physicist and magnetician, who, having been for some time in Australia, was well acquainted with the difficulties that he would have to encounter in such an expedition as he proposed. He (the President) need not remind the older members of the Society how ignorant we were, comparatively few years ago, of the geography of Australia, and what an epoch of discovery was commenced when Sturt and that very remarkable man, General Eyre, late Governor of Jamaica, made their explorations. No man in Australia had passed through greater difficulties, or had endured personal hardships with more hardihood and perseverance than his friend Ex-Governor Eyre. He traversed 1800 miles of country along the southern part of the continent; but, unfortunately, without discovering any of those fertile tracts which have since been met with in the interior of Australia. The region travelled over by him consisted of great arid districts, where he suffered fearfully for want of food and water; but he would remind the meeting that he had still the welfare of the inhabitants at heart, for Ex-Governor Eyre was known as the protector of the aborigines of Australia. To these early expeditions succeeded the explorations of Stuart, Burke, Wills, Landsborough, M'Kinlay, and others; and from what had been done by them and by Leichhardt and others, we had been led to believe that fertile country existed across the continent in the part intersected by the parallel of 23° of south latitude. It was upon this knowledge that Dr. Neumayer had founded his rational project of an expedition, by which he hoped to succeed in traversing for the first time that great continent from east to west. The results of such an exploration to naturalists and physicists, indeed, to all men of science, would be of the highest importance. As one of the most eminent naturalists in the world (Professor Owen) was present, he hoped that gentleman would inform them what he thought might probably be discovered in his department of science along this great line of march, and by such an expedition. He saw also Professor Tyndall in the room, who, he hoped, would also tell them what was to be expected in the domain of physical science from this exploration.

Prof. OWEN said he quite coincided with the author of the paper, in his observation as to the limited amount of our knowledge respecting the natural history and capabilities of Australia. There was no part of the earth of which we Englishmen, who had derived so much from that fifth continent, knew so little as to its organic productions. The little that we do know related to a comparatively small part of the southern and eastern coasts. Beyond that limited region the natural history of Australia might be considered a blank. Therefore, they might well imagine with what interest he entered on this well-devised and well-considered plan of Dr. Neumayer, to obtain for us more knowledge of the peculiar and wonderful works of Nature in her organic realm, which the continent of Australia may still have in store for us. He had said, we know less of the natural history of this part of the world than any other. But he would mention some points of interest in what we did know of Australian zoology, as justifying our hopes of what we might gain from this exploration. In organic nature there was scarcely any general proposition that could be made which was not affected more or less by exceptions. And the most remarkable exceptions to all the general propositions that had been founded upon observations of animal and vegetable life in the rest of the world had been results of discoveries made in Australia. When Cook, Banks, and Solander landed on its coast, almost the first creature they saw moving along the plain they knew not whether to call a bird or a beast, for it moved after the fashion of a bird on a pair of largely developed hinder extremities. It was that most singular form of animal life which we now know as the kangaroo. Observations since that time have multiplied our knowledge of the forms of this group of animals, and now there are some thirty or forty recorded species and genera from Australia. Besides the strange outward form of the kangaroo, we know from dissection that these animals present singular and curious modifications, especially of the internal structure of organs concerned in a recondite part of physiology. Without going into particulars, he might just mention one fact. Here was an animal that, full-grown, can reach nine feet high, whilst its young on coming into the world was not more than one inch in length. It was furnished, moreover, with that marsupial economy for the protection of the young which, in relation to transport to distant pools, seems connected closely with the climate in which the animal lived. Of the marsupial type of animal form there were numerous examples in Australia, differing in forms and habits, such as the wombat, the marsupial wolf, climbing phalanger, and so forth. The duck-mole and its monotrematous spiny ally were now the sole known exceptions to the teated character of their class. When, therefore, we had a knowledge, so singular and unlooked for, of types of two distinct and strange orders of the class of mammalia from one limited part of Australia, what might we not expect, if our observations were extended over the vast interior, as proposed by Dr. Neumayer? As to the birds, Australia was equally wonderful in its productions. Mr. Gould, who spent three years in collecting and observing, from a comparatively limited tract, brought home not a single species that was identical with what we had in our part of the world; even many of the genera were quite distinct. The results of his labours were to be found in the nine folio volumes which he had the good fortune to be spared to publish, on the 'Birds of Australia.' If he obtained such a collection from the south-eastern corner of Australia, what might we not expect from more extended explorations? It was not only the accession to our knowledge of new species and genera of birds and beasts, but, like the immortal discoveries of Robert Brown in botany, these acquisitions led to a re-casting of the science. The habits of some of the birds were most peculiar and instructive. We know that the magpie and the jackdaw are attracted by glittering substances; that if a lady in the country leaves her dressing-room window open, her best brooch may be taken and hidden. It seems a most idiotic procedure of such feathered pilferer. Yet the explanation of that curious habit is given by Gould, in connection with cognate birds in Australia, where they are not disturbed by man. The chlamydera is allied to our own magpies, and at the courting season the male bird builds a beautiful bower or avenue, overarched by long twigs or grass-stems, the entry and exit of which are adorned by various showy objects, as if to attract a mate by the show of a handsome establishment; which show the lover makes by picking up every pretty shell, every gay-coloured parrot's feather, every glittering mineral—even a gold nugget, if it came in his way, would be added to the heap. But this bower-building and adorning was not essential to the work of continuing the species, for the female built her nest in the neighbouring tree. And to this indispensable construction our magpies and jackdaws were limited; they could not make their bower. There was not a wild or waste left in well-peopled Europe where they would not be scared from such work of supererogation—where some wanderer would not be attracted by their hoard. But now and then a little bit of the ancestral instinct would come out, which we should never have comprehended if it had not been for the observations of Gould. Again, Australia was the only country where birds put their eggs out to nurse. The mound-birds built up a heap of leaves twelve or fourteen feet high, and deposited their eggs in this mound, and left them to be hatched by the heat of the decaying vegetation; thereby showing a curious analogy to the snakes in our own country. Again, a word as to another class of animals,—the reptilia. The great Lace-lizard—largest of living Saurians (*Hydrosaurus giganteus*)—has its habitat in Australia; and, in the newer tertiaries of Queensland, vertebræ of a nearly allied Valanian lizard, almost rivalling in size those strange gigantic iguanodons and megalosauri of our older strata, had been found associated with remains of most strange, and, in some instances, gigantic forms of extinct marsupial quadrupeds. Some links between *Diprotodon* and *Macropus*, *Nototherium* and *Phascolarctos*, *Thylacoleo* and *Thylacinus*, *Megalania*, and *Hydrosaurus* might be hoped for in the vast central tracts from east to west, now proposed to be explored by competent observers, with adequate means of collecting and preserving specimens. But then came the question, how were we to succeed in such expectations as these. He would appeal to gentlemen who had contributed to the prosperity of the British empire by their successful and sometimes daring speculations. For want of proper organisation, and for want of proper support, most explorations in Australia hitherto had been comparative failures. To this cause the results of Leichhardt's adventure had been lost; and, worse than that, we had lost Leichhardt himself. A man of business embarking in a commercial speculation with insufficient capital to command success, meets more blame than sympathy if he loses his venture: yet such unwisdom has characterised many of the exploratory surveys of the *terra incognita* of our great colony. Not only is the inadequate investment lost, but also the information gained by the explorers, by loss of the explorers themselves. In the present exploration he hoped for the sympathy of those who had gone out to Australia and had returned to this country with riches and honours. Dr. Neumayer was a scientific man, who held a position in Australia analogous to that of the Astronomer Royal in this country, and his well-considered project deserved our utmost attention. What he asked for was a sum of 7,000*l*. a-year for three years and a half; and he could not believe that either the Government or the Legislature would refuse that sum for an object so important; nor could he doubt that the Australian colonies themselves would supplement the grant by 5000*l*. or 6000*l*. more. A landed proprietor feels it not less his duty than his interest to have a due "survey" made of his property. The State seems to be in like relation to her colonies; to know their capabilities, their natural sources of wealth, is the essential preliminary to the derivation by the mother country of the full advantage of lands discovered and acquired for her by successful navigators.

Professor TYNDALL said the only point on which he felt himself competent to speak was quite an outlying subject, namely that of solar and terrestrial radiation, for observations on which Dr. Neumayer was eminently competent. He had had the opportunity of becoming acquainted with Dr. Neumayer, and the impression which he had derived was that Dr. Neumayer was a man of perfect straightforwardness and truth, and that he was entirely competent to undertake the work that he proposed to carry out.

Dr. NEUMAYER said he could only express his sincere thanks with reference to the words which had fallen from Professor Owen and Professor Tyndall.

Such words could only come from men who felt for science the same regard which he believed he had himself shown during his lifetime. It might, perhaps, appear strange that a foreigner should come forward to propose what he called a national British undertaking. But when they considered that he had been travelling along the coast of Australia at a time when the gold-fields had not been discovered, and when they further considered that he established on that continent the first observatory for physical observation, the results of which he had published in several volumes, he thought they would admit that he was entitled to consider himself an Australian colonist, and that he had not unsuccessfully aided, to the best of his ability, in the noble effort of British colonisation in Australia.

2. *Geographical Results of the Abyssinian Expedition, No. 4.* By C. R. MARKHAM, Esq., Secretary R.G.S., Geographer to the Abyssinian Expedition.

IN this Memoir, the fourth and concluding one of the series, Mr. Markham commenced by stating that the country between Antalo and Magdala is a mountainous region, entirely composed of volcanic rock, but divided into two very distinct parts by the river Taccaze. That to the north is an elevated ridge, crossed by several lofty ranges of mountains; whilst that to the south is a plateau of still greater height, cut by ravines of enormous depth. From Senafé to Antalo the rocks are almost all aqueous or metamorphic, with a few trachytic and basaltic boulders on the surface; but to the southward of Antalo there is a complete change, and this change is not confined to the geological features of the country. The scenery becomes grander, the vegetation more varied and more abundant, and the supply of water more plentiful. The peculiar feature of the country south of Antalo is that, while the backbone of the mountain-system runs north and south, with drainage to the east and west, it is crossed by ranges of great elevation, running across it in the direction of the drainage, and dividing it into sections. Of this nature are the Wodgerat and Ferrah ranges. From the Ferrah Amba there is a range of mountains running north and south, and forming a distinctly-marked watershed as far as Ashangi. The lower country to the eastward of this alpine region, from Antalo to the Taccaze, is occupied by lawless tribes of Mohammedan Gallas, who make incessant raids on the Christian inhabitants of the highlands, whose villages are seen usually perched on isolated hills surrounded by thick fences.

The mountainous country between Makhan and the basin of Lake Ashangi, about 14 miles across, is well wooded, the hill-sides being covered with junipers as tall as Scotch firs, flowering St. John's wort growing as trees, and a heath bearing white flowers, and forming a bush sometimes 30 to 40 feet high. The drainage is still to the eastward, lofty peaks shutting out the view to the west. Looking from the highland the bright blue lake of Ashangi appears far below, bordered by a richly-cultivated plain and surrounded by mountains on every side. The lake is four miles long by about three broad, and is 8200 feet above the level of the sea. Mr. Markham found its latitude by meridian altitude of ✱ Dubhe to be 12° 35′ 26″ N. It furnishes one of the very rare examples of a fresh-water lake without any apparent outlet, the water probably escaping at some point on the eastern side by percolation; the surrounding mountains are all volcanic.

South of the Lat valley, the Dafat mountain-range crosses the line of the watershed, and about 16 miles further south is the still loftier parallel range of Abuya-meder, which forms the northern boundary of the valley of the Taccaze; the Dafat Pass was found to be 9820 feet above the sea-level. The country hereabout is well wooded, and a rippling stream flows down every valley; there is much cultivation in terraces up the mountain-sides. The streams flowing down the deep ravines to the south unite, and form the Taccaze. The most distant source was some 10 miles away due east from the line of march, in Angot. The Taccaze flows from east to west in a deep valley; the bed of the river being 7795 feet, and the summit of the plateau on its southern bank 10,700 feet above the level of the sea.

From the Wondaj Pass, south of the Taccaze, the British army obtained their first view of the Wadela plateau, a mighty wall 2600 feet high, rising abruptly from the valley, and ending in a level summit at an elevation nearly equal to that of the Wondaj Pass itself. At this season (March) the river was but a small stream, easily crossed dryshod by jumping from stone to stone; but the extent of the river-bed showed what it was during the rainy season, even at this short distance from its source. With the exception of clumps of kosso and other trees round the churches, Wadela is without either trees or shrubs, the hills being covered with grass and small wild herbs, the most common of which is a bright yellow composite shrub. The scenery is wild and desolate, not unlike that of the interior of the Orkney Islands. The people weave woollen and cotton cloths, the wool being raised on the plateau. The English troops, after crossing the Taccaze and reaching the plateau, instead of marching direct on Magdala by Kosso Amba, turned off in a south-west direction in order to reach the great road made by King Theodore across the Jita ravine, from the Wadela to the Talanta plateau. A large part of the length of Wadela was thus traversed, the ground sloping gradually from 10,400 feet to 9100 feet, which is the height of the precipices above the Jita. The ravine is cut down to a depth of 3500 feet, through columnar basalt, the detritus in the slow course of ages having been carried down to fertilise the Delta of the Nile. Had it not been for King Theodore's marvellous road, this ravine would have been the most formidable obstacle on the whole line of march.

The Talanta plateau is a mass of columnar basalt, between the rivers Jita and Beshilo; it is a flat plain, quite treeless except the clumps round a few churches. The flora at this high elevation resembles that of north temperate climates; dog-roses, nettle, yellow and purple compositæ, clover, and plantain. The ravine of the Beshilo is even deeper than that of the Jita, the bed of the river being only 5638 feet above the sea, and the river itself was up to the horses' girths, being far the largest volume of water that had been met with in any stream on the line of march. The length of the descent was 4 miles 4 furlongs, and the width of the river-bed 113 yards.

The Magdala system or knot of mountains rises up between two ravines, south of the Talanta plateau, the sides to the east and west being steep and nearly 3000 feet high. Magdala itself is a mass of columnar basalt, with scarped perpendicular sides and with a plateau on the top, about two miles long by half a mile across. It is 9050 feet above the level of the sea, and thus a few feet lower than the Talanta plateau. Besides Magdala, the group comprises the peak of Selassie and the plateau of Fala; the three heights being connected by saddles at lower elevations. Between Magdala and Selassie is the saddle of Salamgi, 6 furlongs in length, a flat plain on which the camp of King Theodore was pitched; with perpendicular cliffs on either side, whence the mountain-sides slope rapidly down to the Menchura and Kulkula ravines. The height of Selassie is 9200 feet above the sea, and is composed of trachyte of a light colour. It is connected with Fala by a saddle some 100 feet below the level of Salamgi, which is approached from it by a rocky zigzag path. But these three heights are not in a line; they form an angle of which Selassie is the apex, and Magdala and Fala the two legs. At the foot of Fala is the small plain of Arogi, 1 mile and 3 furlongs across, with a gradual slope of 440 feet, and 1140 feet below the Fala plateau.

The Magdala district is not properly speaking a mountainous region, but simply a portion of the great basaltic mass of which Talanta is a part, cut up and furrowed by the action of water during many ages. The climate of the region between Antalo and Magdala was, in March and April, healthy and agreeable, the hot sun being tempered by cool winds during the day, and the nights being cold. From March 12th to 24th there was not a drop of rain, but in the evening of the latter day a heavy thunderstorm broke over the camp at Dildi, with rain lasting from 6 to 9 P.M. Other showers occurred afterwards. The Wadela plateau was excessively cold, with ice forming in the night, and the grass covered with hoar-frost in the mornings. The minimum registered was 17° Fahr. The Talanta plateau was much warmer, owing probably to the deep warm ravines of the Jita and Beshilo, which flank it on either side.

Mr. Markham, in conclusion, summed up the geographical results of the expedition, and mentioned the work done in other departments of science, particularly in geology by Mr. Blanford, and in meteorology by Dr. Cooke. The officers of the Indian Trigonometrical Survey had also completed the mapping of the eastern portion of the Abyssinian highlands.

The Memoir, together with the three preceding ones, will be printed entire in the 'Journal,' vol. xxxviii.

The PRESIDENT, in returning the thanks of the meeting to Mr. Markham for his vivid description of the country over which the British army had marched, said that the present was the fourth paper which he had sent home during the campaign. We could not have found any man more capable of observing the geographical features, and of describing well what he had seen. He had already told them that Mr. Markham lost no opportunity of attending to his main object. Even in the day of that great excitement when Magdala was taken, he himself, being one of the first party to enter the hill fortress and to see the dead body of Theodore, succeeded in making two observations for latitude. Alluding to the touching episode Mr. Markham had given them respecting the last days of King Theodore, he added that it was the first clear account which had been given of the last days of a man who, although he was a barbarous king, had striven zealously and with considerable capacity to render Abyssinia an united country.

Fourteenth Meeting, 22*nd June*, 1868.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in the Chair.

PRESENTATION.—*T. Plowden, Esq.*

ELECTIONS.—*George Harvey, Esq.; William Rankin, Esq.; Gustaf Roos, Esq.; Rev. J. S. S. Robertson,* M.A.

ACCESSIONS TO THE LIBRARY FROM JUNE 11 TO JUNE 22, 1868.—'Marchand's Voyage, 1790-92.' 2 vols., 4to. Chenier's 'Morocco, 1788.' P. M'D. Collins' 'Voyage down the Amoor, 1860.' B. F. Bourne's 'Captive in Patagonia.' 1853. J. B. Fraser's

'Travels in Koordistan.' 1834. Donor, J. V. H. Irwin, Esq. 35 Volumes of Reports and other Documents relating to La Plata, Uraguay, Santa Fè, Buenos Aires, Confederacion Argentina, &c. Donor, T. J. Hutchinson, Esq. 'The Philippine Islands, Moluccas, Siam, Cambodia, Japan, and China, at the close of the 16th Century.' Hakluyt Society's Publications. 'The Alpine Journal; a Record of Mountain Adventure and Scientific Observation, by Members of the Alpine Club.' Donor, the Alpine Club. 'The Student's Manual of Ancient Geography,' by W. L. Bevan, edited by W. Smith. Murray, 1867. Donor, the publisher. Anderson's 'Narrative of an Embassy to China in 1792-94.' Donor, S. M. Drach, Esq. 'Exploration of the River Javari by Señor R. y Paz Soldan.' 1867.

The following Papers were read:—

1.—*Route from Erzerum to Diarbekr.* By JOHN G. TAYLOR, Esq., H.M. Consul, Diarbekr.

AN abstract of this lengthy and important paper, communicated by the author to Mr. J. K. Lynch, F.R.G.S., was read to the meeting. Mr. Taylor stated that from Erzerum as far as Erzengan his route lay over an often-travelled country, and being well known did not require any further description; but from Erzengan he traversed a country, as far as Mazgerd and Kharput, hitherto quite unknown to Europeans, even to that old Asiatic traveller Barbaro, though he must have been very near the line of road which he (Mr. Taylor) found so well repaid his trouble.

By reference to the map it would be seen that only two practicable routes are known from the north through the Deyrsim Mountains to the plain of Kharput. They both concentrate at Mazgerd, and had already been described by Mr. Taylor in a paper transmitted to the Royal Geographical Society. The object of the present journey was to trace a third route through the mountains, also to Mazgerd, the debouching point, as shown in the paper above mentioned, of all communications between Kharput and the north; and to search for ancient inscriptions, which—Mazgerd having occupied, as the author had pointed out, a prominent place in that period—he hoped would be found in its vicinity; both objects, he was glad to report, had been realised.

In his previous memoir he had given a full account of Mazgerd,—its old Pyre appertaining to the Parsee worship, and some facts relative to its ancient history,—a recapitulation of which would here be useless; but it was necessary to bear that description in mind, as adding much interest to the present route, which leaving Erzengan follows the south side of the plain on which that town is situated, and enters the low mountains of the Koozichan district, in which the plain is lost. These mountains further on rise higher and higher, culminating in the snow-capped heights of the Deyrsim, which, as seen from this point, seem to bar all further progress, before reaching which the party came to a village called Pilameer, which was from Erzengan the first stage on the road.

The name Pilameer may easily be derived from, or be an abbreviation of, Pul El Ameer, the Ameer's Bridge. On his arrival he was very hospitably received by the Kizzelbash chief, Shah Hoosein Beg, whom he induced ultimately to conduct him through the new route.

From Pilameer Mr. Taylor was surprised to find a good road, though hilly in parts, leading through the Koozichan district as far as the Deyrsim range, through which, though popular error represented it as inaccessible, a remarkably easy route exists all the way to Mazgerd, never, he believed, since the days of the Seleucidæ, traversed by civilised beings, and which the jealousy of the Kurds has hitherto concealed from foreigners, for the obvious reason that the former do not wish it known that so easy a route exists through their formidable mountains. It passes through undulating valleys studded with thriving villages; and the country on either side is beautifully wooded with oak, pine, and poplar, and opens here and there into fine level, well-watered plains. Two considerable affluents of the Muzoor Su, that great tributary of the Murad Su, or Upper Euphrates, rise in these valleys, called by natives the Dor Boghaz Su and the Hidor Kighi, or Pirzi Su: the former joins the Muzoor Su near Pakh, and the latter at Pirzi. Neither of these great affluents appears on any map, and the course of the main stream of the Muzoor Su, as laid down by Kiepert, is altogether erroneous, as would be hereafter pointed out.

The ruins which exist in and about the villages are principally the remains of old churches, mediæval Armenian; some of them being not more than five or six hundred years old. These valleys are inhabited by a numerous population of Kurds, though a few members, sparsely scattered, of the Armenian nation still exist on mere sufferance, and, of course, are comparatively indigent. The Kurds appear well off, and the seclusion which they enjoy protects them from the impositions and taxes laid on their less fortunate brethren. Two hours before reaching Mažgerd a place is reached where volcanic action has thrown up a large mass of needle-pointed rock, which has at one time been scarped and formed into an impregnable castle. Where it could not be scarped, and round its weak points are traces of Pelasgic walls. No real building is to be seen on the rock, which has been hollowed out, and chambers and galleries formed, which are ornamented with some taste by a waving scroll having been sculptured round the roofs and doorways. On the very top of this mass of rock are the remains of a room, or probably an old temple, from which an extensive view of the mountains and plains, about as far as Kharput, is obtained. Before each gate is a vaulted entrance or portico, furnished with seats, all of which are cut out of the rock. On the walls of one of these porticos, Mr. Taylor had the good fortune to find his anticipations crowned by the discovery of a cuneiform inscription * of sixteen lines, which from the character he hoped would turn out Assyrian, and probably one of Tiglath Pileser's. The position of this inscription in the old gate is very interesting, as determining in some measure its great age, and as corroborating the author's opinion, communicated in a former memoir, that Mazgerd was the gate of the Deyrsim and commanded the easiest, shortest, and most practicable route through the mountains to the north and the Black Sea. He set to work and took a cast of the inscriptions which he transmitted by a Tartar messenger to Erzerum, to be thence sent to Sir Henry Rawlinson. Opposite this cuneiform inscription was an elaborately-formed cross, which shows that this castle occupied a prominent position in two widely distant periods of history. Mr. Taylor added that he had also made many observations, and collected materials for a new map, which, with the one previously forwarded, would, he hoped, give a good and true idea of this country.

The original Paper will be printed in *extenso* in the 'Journal,' vol. xxxviii.

The PRESIDENT said this was but a very brief abstract of one of the most elaborate and valuable communications on comparative geography that had ever been made to the Royal Geographical Society. By the courtesy of Lord Stanley, the original documents which were communicated to the Foreign Office, had been, upon the representation of their President, transferred to the possession of the Royal Geographical Society. Therefore, in the first place, they had to return their best thanks to Lord Stanley and the Foreign Office. He regretted the absence of Sir Henry Rawlinson, who was best able to do justice to Mr. Taylor's researches into the historical sites and antiquarian remains of Kurdistan. He saw present, however, one gentlemen—Mr. Lynch—who knew a great deal of that region, and he should be glad to hear from him any observations he might wish to make.

Mr. LYNCH thought the paper was one of great interest, as it opened up a country of which we really knew scarcely anything. We had hitherto been entirely ignorant of this line of communication, re-discovered by Mr. Taylor, between the valley of the Euphrates, Babylon, Assyria, and, indeed, all those seats of the earliest civilisation, and Europe. He (Mr. Lynch) had himself travelled over that country from Constantinople by two routes into Southern Asia; one by Tabreez and Persia, and the other by Aleppo and Syria, the more southern route. He had also travelled by a third route, the direct one from Constantinople to Baghdad, over the Mehrab Dagh, the highest and most inaccessible of the Taurus ranges, which was a most difficult passage, particularly in the winter. An expedition under Colonel (now Sir Fenwick) Williams, sent out to determine the Persian and Turkish boundary, was shut up for months by the snow in this region, and it was supposed there was no possible way of getting into Southern Asia except over this Mehrab Dagh. The value of Mr. Taylor's paper consisted in this, that he had discovered a route the whole way from Erzerum to Kharput, so easy that a railway could be laid down along it. In addition to this Mr. Taylor had found very interesting inscriptions in the cuneiform character illustrating the history of that country in a remarkable degree. One discovery was a small gold vase, which was now in his (Mr. Lynch's) possession, and a lithographic drawing now lay on the table for the inspection of the meeting ; it had been dug out of a mound near Nisibin, and had been pronounced by connoisseurs to be of the true Assyrian type.

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* Note by Sir Henry Rawlinson:—"This inscription, although written in the Assyrian character, is in the old Armenian language, and belongs to Ruza, son of Arghisti, who was king of the mountains of Nairi. Arghisti was contemporary with Sargon and Sennacherib, Ruza with Esar Haddon and Asshur-bani-pal (Sardanapalus). It probably dates from about B.C. 660, and is the latest Armenian inscription yet found."

Lord HOUGHTON said the paper related to countries of so much historical importance that he regretted it had not been delivered to us in further detail. He thought it was a curious illustration of the value of the Royal Geographical Society in awakening an interest in what he might call the by-paths of known countries. The great caravan-routes round this district were as well-known to ordinary geographers as the railroads of England. But there was this feature, that in the middle of Kurdistan there existed a perfectly easy mountain-road, unknown to the travellers who passed through the country. It was kept almost from the knowledge of the Government of the country itself, and yet it was full of beauty and interest. He thought we might be proud that the Geographical Society did help towards these discoveries, by exciting the attention and endeavours of travellers. We knew all the great aspects of the world, we knew all the great routes of the world, we knew by inference and analogy the nature and peculiarities of most districts of the world which had not yet been visited. It remained for this Society and other similar societies to do what was most important and most useful, namely, to complete the work of investigating these little interior spheres of unknown countries such as the present which had been visited by Mr. Taylor. He could only recommend that other travellers should undertake a similar work in other regions, and present their reports to this Society.

2. *On the Geography and Recent Volcanic Eruption of the Sandwich Islands.* By Dr. THOMAS STALEY, D.D., Bishop of Honolulu.

BEFORE speaking of the late volcanic eruption in the island of Hawaii, the author said he believed that a few words might be useful on the geography of the group generally, of which Hawaii is the largest and the youngest member. He proceeded as follows :—

The Sandwich Islands, now constituting the kingdom of Hawaii, occupy a most central position in the Pacific. They lie in a diagonal direction from S.E. to N.W., between 18° 50′ and 22° 20′ of N. lat. (so that they are only just within the northern limit of the Tropics), and between 155° 10′ and 160° 40′ of W. long. Their total area is upwards of 6000 square miles. Beginning with the most westerly, Niihau, about 15 miles long and varying 1 to 3 in width, taking a north-easterly direction, we come to Kauai. These two have an area of 550 square miles. Crossing then a channel, which between the nearest points of land on either side is 80 miles in width, the next in order is Oahu, on which is the capital city of Honolulu, the chief port of the kingdom. Its area is 530 square miles. The others occur at less intervals, viz., Molokai, Lanai, Maui, with the islet of Kahoolawe. These four may be put down as having an estimated superficies of 800 square miles. About 4000 will be found to represent that of the largest island, viz., Hawaii. The harbour of Honolulu is formed by a coral reef acting as a natural breakwater. A passage is marked out by buoys, and through it vessels drawing above 20 feet can now enter. When the American Pacific Steamship Company, in 1866, proposed to run a line of steamers monthly between San Francisco and Yokohama (Japan), they sent an agent to Honolulu, on whose representations the Government deepened the harbour, and extended their wharf seawards, so that these large vessels of between 2000 and 3000 tons might coal at its side. When all had been accomplished, the Company thought that the deflection from a great circle course, and then having to beat up in a higher latitude against the there prevalent west wind (a sort of return Trade), would cause loss of time; and they wished to cross in 18 days. In no instance, however, since the line commenced running has the voyage been accomplished in less than from 20 to 30 days. The fact is, they are finding the distance too great to carry the enormous quantity of coal necessary for the voyage: and so that, after all, by touching at the Hawaiian Islands they would make a quicker and more certain passage, and, from a larger space being available for freights, one more profitable. While speaking of the geographical position of Honolulu, and its effects on the commercial prosperity of the islands, I may state that within two years at the most, the railway between New York and San Francisco will be completed. The journey from Liverpool to Japan would then be distributed as follows:—

To New York	12 days.
San Francisco	7 „
Honolulu	8½ „
Yokohama	13½ „
	41

An addition to this of 8 days would extend the voyage to Hong Kong, the whole then being done under 50 days.

How far England had been wise as regards her interests in neglecting the often-suggested plan of carrying her trunk line of railway from Canada, through British Columbia, to the coast, it is not for me to decide. I will only say that when the distance between New York and San Francisco is accomplished in 7 days (instead of in 23, as now it is, over Panama) the present overland route to China by Suez would find it hard to compete, so far as passenger traffic goes, with the more rapid, healthier, and pleasanter route over the North American continent.

Happily for the social and moral improvement of the Hawaiians, the whaling trade has fallen off. In 1867 there were only 90 whalers, in the autumn, at Honolulu. The other vessels entering were; national or men-of-war, 9,—of which 5 were British, 2 American, 1 Russian, 1 French; merchantmen, 109,—of which 54 were American, 24 British, 29 Hawaiian, 2 under other flags. To supply the wants of these ships, no less than of the native and foreign inhabitants, imports are required. Those for 1867 amounted in value to nearly 2,000,000 dollars.

Climate and Productions.—Honolulu is under the isothermal line of 77° Fahr., the annual range of the thermometer being only 12°. At other places (according to aspect and elevation, of course) the temperature is very different. At Waimea Hawaii, in the month of July (on a table-land 4000 feet above the sea-level), I have been very glad to have a fire in the room where I slept. Here the average reading is 64°, with a maximum range of 32°. Perhaps nowhere, with the same extent of coast-line and surface, are the local climates so various. Though in the tropics, really there is no tropical wet season; the heaviest rains falling at the winter and not at the summer solstice, as they do in India, for example.

It is *then* the north-east trades—which prevail for 9 months of the year, depositing the vapours of the ocean on the northern and eastern slopes of the islands in gentle fertilizing showers—for a while cease, while southern winds take their place, bringing heavy rain and storms known by the name of konas. It is the eastern trade wind to which we refer when we speak of the windward or leeward side of the islands, and sailing to windward from one island to another. On the whole, the climate is most favourable to vegetation. The soil, volcanic in its origin, is generally fertile. The grass, now very prevalent, though not an indigenous one, is that called the *Menenia*, running along the surface, striking roots everywhere on its course into the ground, and forming a most nutritious food for sheep and cattle. There are many cattle "ranches" (as they are there termed) and sheep-farms, in the hands of emigrants chiefly from New Zealand, Australia, British Columbia, and California.

The increase in the sugar cultivation during the last few years has been remarkable; plantations, with mills for grinding the sugar, and all the best and newest appliances sent from England and the United States, are to be found scattered everywhere throughout the kingdom.

The export last year was 17,127,187 dollars. It is now about 1000 tons per month. This important element in the industry and material properity of the islands, present and future, is in the hands mainly of American, German, and British settlers. The labourers are the natives, and about 1000 Chinese coolies, imported by the Government.* Generally the planters prefer the former; but the Hawaiian population is too small, without calling in the aid of the latter, adequately to supply the labour market. In a cursory glance, such as this, at the physical conditions of these islands, in relation to the industry and pursuits of their inhabitants, perhaps this is the proper place to say a few words on their social condition and political status. The last census, taken in 1867, shows a *decrease* of the native population of 8300 (in *seven* years)—or of 11 per cent.)—and *in*crease of 400 of white foreigners, or of 15 per cent., in the same period; the total population being 58,765 natives and 4194 foreigners. Into the causes of this fearful decimation of native people I will not here enter, further than record my own conviction that though at the period of their discovery by Cook, in 1778, the population was even then numerically on the wane, their diminution has been accelerated by their contact with the habits, and, I grieve to say, the licentiousness of many of our own race.

The whole Hawaiian Archipelago has been uplifted from the ocean by volcanic agency. Indications are not wanting that the same process is still silently and imperceptibly adding to the elevation of the coast-line throughout the group. The facts on which such a view is grounded are not in my possession, but they furnished, a few years ago, the subject of a very interesting paper in a local journal, contributed by an English gentleman resident at Honolulu, who has the reputation of being a thoughtful and able geologist. It would seem that the emergence of some portions of the islands had been exceedingly rapid. In the island of Molokai well-defined coral is found at the height of 500 feet above the sea-level. A bed of coral or coral-sand exists on an elevation in Kauai 4000 feet above the sea-level. Kauai, with its islets, is far the oldest of the islands. Its volcanic mounds and craters have been rounded off, so to say, in the course of ages, into gently undulating hills. The scenery is soft and beautiful. It is a perfect garden in appearance, and most fertile. Still there are some craters and palis to be found in it of great antiquity. The valley of Hanapepe, at the head of which is a beautiful waterfall, has apparently been formed by volcanic action. The basaltic rocks and strata over which it falls have been much reversed and upturned, and present their columnar structure very distinctly to view, inclining to opposite directions at a vertical angle of about 30°.

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* Since this paper was read, 185 Japanese labourers have been imported by the Hawaiian Government, and many more are being asked for, while the authorities of Japan have intimated their wish for Hawaii to send thither all the crude sugars they can manufacture. The demand there is stated to be inexhaustible.

Proceeding 80 miles eastwards, we come to the central group, which, though with no active volcanoes at work, are of a later origin.

No severe or destructive earthquakes are experienced in these islands, but only very slight vibrations. I except the submarine shocks, which, as in December, 1860, caused a rise in the harbour of Kahului eight or ten feet above its usual high-water level, spreading over the beach and destroying several houses. The chief extinct craters in these islands are in Oahu, Punch-bowl Hill, on which the fort at Honolulu is built—a comparatively small one—and Diamond Head, a few miles east of the same city. It is a promontory, on the top of which is a deep concavity. But it is at Maui we find the largest crater known, I believe, in the world. It is 10,000 feet high, between 20 to 30 miles in the linear measure of its rim, and more than 2000 feet deep. It forms the umbilicus, so to say, of East Maui, which is one vast mountain, culminating in this crater; the sides rich in verdure and all kinds of vegetation. It will be seen the island of which I speak consists of two well-defined portions, connected by a sandy alluvial neck or isthmus, the lowest part of which is only seven feet above the sea. The sand is constantly shifting, and as you pass in a vessel on the leeward side you may see clouds of it blown out to sea under the action of the trade-wind. The rock of the cliffs on the east of West Maui, which it terminates sharply, is basaltic. Anything grander or more awful than the view into that deep crater of Hale o ka la, as it is termed, cannot be imagined. It has, however, been so well and so often described, that I will not dwell on it now, but rather hasten to speak of that island which is the scene of modern volcanic action, where it has so recently been displayed with a frightful result to life and property. It would appear that the retreating of active volcanic influence from north-west to south-east, which has been stated to apply to the whole of the group, does so equally to the Island of Hawaii itself. In the north of the island are the heights of Kohala and Mauna Kea (13,000), the last covered with perpetual snow, skirting the grassy and fertile plain of Waimea. Here are craters never active within the period of the traditions of the people. In fact, a line passing through Mauna Kea from west to east would nearly define the parts to the north and south of it, *now* respectively exempt from, and exposed to flows of lava, and even to destructive earthquakes. Running then parallel with the coast on the west is Hualalai, the last eruption of which was in 1800, A.D., when the stream of lava filled up a bay 20 miles long, and formed a headland running three or four miles into the ocean.

Mauna Loa, or, as it implies, *the great* Mountain, 13,500 feet above the level of the ocean, is to the south-east of Hualalai. On its eastern flank, about 30 miles from the coast, and on a plane 6000 feet above the sea, is the celebrated *pit crater* of Kilauea. Its outer rim is about *nine* miles in circumference. You descend some hundreds of feet down a zigzag path cut in the precipitous sides of the pit, till you come upon a black ledge. Passing banks of sulphur, and huge blocks of basaltic rocks confusedly heaped together, occasionally springing over crevasses of unknown depth, and walking over every form of solid lava, still warm to the feet, you come to the part which is always more or less active. When I saw it the diameter was quite 500 yards; but its area sensibly alters. The depth and immense size of the pit may be expected to keep the lava from overflowing the country, as hitherto, at least in the period of history, seems to have been the case. Between 1856 and 1859 there were subterranean flows, which, after some time, came to the surface 20 miles to the north-east. But usually this volcano (Kilauea) is not mischievous. It was in 1859 an eruption of Mauna Loa last took place, passing round the northern end of Hualalai, destroying a village in its course, and projecting the coast-line some distance seawards. The whole country for some miles round this mountain is, if I may so say, one great field of cinders.

I can speak from experience that the ride from Kealekekua Bay, through this lava country to the volcano of Kilauea, and thence to Hilo, during its greater portion at least, is the most trying and painful possible. But from the central table-land on which stand these huge volcanic masses, all round to the coast, the country is fertile, dotted with villages, cattle ranches, and sugar plantations. But over the southern slope now, alas! has swept the most frightful devastation.

On March the 27th, a visitor to the Kilauea observed that the fiery lake had overflowed its usual limits, filling that part of the pit crater with an immense covering of lava. On the same day a column of smoke was seen to rise to an immense height from the summit of the mountain. The next day began a series of earthquakes, not apparently destructive until the 2nd of April, when the most terrific shock of all took place. In the interval one of the English clergy, with his diary and watch at his side, took notes of the direction, violence, number, and time, of each oscillation; whether vertical or horizontal, whether prolonged or instantaneous. His observations are most interesting, and I trust may serve in some way the purposes of science. Upwards of 300 earthquakes were registered by him; some, however, occurring in the short intervals of sleep, and consequently unheeded.

It was the earthquake of the fifth day, April the 2nd, which was so disastrous. Its destructive force was felt most at Kapapala, south-east of the mountain. The land all round a cattle ranch situated here was subjected to a severe mud eruption, burying hundreds of cattle beneath it. A tidal wave the same day for 50 miles north of Alualu rushed inland, destroying several villages and many lives. Stone buildings were hurled down, sometimes burying people in the ruins; not only in the south, for houses were thrown down in Kona and Hilo. The settlement at Waiohino was utterly destroyed, thirty-three persons perishing through the earthquake or tidal wave.

On the 7th of April, ten days after the first symptoms of the convulsion, a new crater opened on the flank of Mauna Loa, whence a stream of lava flowed into the sea half-way between Apua and the southern point, the mud-flow meanwhile wending its course to the north of this direction. One of the fairest parts of the island was thus in a single day converted into a black-looking, desolate tract of cinders and mud. In many places in Kau the ground has opened, chasms of unknown depth have formed, whence sulphurous exhalations are emitted: a fissure, some miles in length, has extended inland from the coast, crossing one of the island high roads, and so deflecting it that what were contrary sides before are, at the point of breakage, now in one and the same straight line.

The floor of the crater in the Kilauea volcano has sunk some hundreds of feet. At Lahaina, 120 miles from the starting point of the eruption, the column of cloud ascending from it was observed under an angle of 3° 30′, which (allowing for 500 feet of altitude, the position of the observer) indicated a height of nearly eight miles. So vast a body of vapour rushing visibly upwards with tremendous rapidity, proved the presence of an immense heat at its base. The great rarefaction by heat of the air near the new crater would cause a powerful upward draught: then the cold air, charged with the vapours of the surrounding sea, would rush in to take their place. Rapidly ascending vast quantities of water would be precipitated in the form of cloud, and, when cooled, sink and be borne westwards by the trade-winds. This exactly happened; for, days after the eruption, the leeward islands were enveloped not only in a close oppressive atmosphere, but in clouds and heavy rains. A very distinct odour of sulphurous acid was perceptible at Honolulu, 200 miles distant, two days after the eruption.

The facts that I have grouped together connected with the recent catastrophe may serve possibly the purpose of those who investigate the laws, if there be such, which regulate volcanic agency.

I cannot conclude without mentioning the touching fact of the King going himself, heedless of danger, in a steamer chartered for the purpose, with food and clothes to distribute to his poor starving people, and to bring away the homeless and bereaved to a place of security.

The PRESIDENT was sure they must all feel proud that this most interesting communication had been prepared by a bishop of the Anglican church, who was a Fellow of their Society, and who had shown himself so well able, from the knowledge he had acquired, to treat not only of the statistical condition of the islands, but also of the remarkable phenomena connected with the volcanic eruptions. It did honour to the British Government to have placed a man like the Bishop of Honolulu in the position which he now occupied. For himself, he could scarcely realize whether he was presiding over the Geological Society or the Geographical Society, for the latter part of the paper was a truly Geological description of the volcanic phenomena and the physical features of these islands. He believed it might be necessary to request his lordship to give a repetition of the latter part of his paper at the Geological Society, where they would be bound to discuss what were the different ages of the elevations of which he spoke; whether the corals that had been highly elevated were the same as those that now lived in the sea, or whether they belonged to extinct species. These were interesting questions for the consideration of the geologist. He must say that, looking at what we knew of the Hawaiian Islands twenty years ago, and comparing it with what the Bishop had put before them, they would not fail to observe what a remarkable change had been effected in these years by British and American industry. He begged to express his special thanks to the Bishop of Honolulu in the name of the Society.

Lord HOUGHTON need not say how valuable it was to receive such records at first hand from our countrymen who went to distant parts, and yet kept up their interest in the old country. He knew, from family and local connections, how worthily the Bishop fulfilled the duties of his sacred office, and how he appreciated all the great interests of the country of his adoption, and yet kept a watchful eye upon any phenomena that might interest his countrymen at home. It showed that he had not broken off his connection with this country, and that though somewhat separated he was not totally disestablished. They thanked him very much for his communication, and begged to assure him that whatever might be our political relations, we should always be glad to preserve those intellectual and friendly relations with the Sandwich Islands which now existed. He hoped public attention would be drawn to what the Bishop had said with regard to the route, which might be called the circumambient route of the world, that he had suggested. He had shown in how very short a time we might go across the continent of America, and by way of Hawaii to the most interesting parts of the East and back again to England. None of us could forget the interesting visit of the widow of the late sovereign of that country to England, and the affectionate and peculiar interest which her natural qualities and the dignity of manner which she possessed attracted towards herself in this country.

The BISHOP of HONOLULU said the last he heard of Queen Emma was, that she had been engaged in raising a fund for the relief of the distress which had been occasioned by the volcano. She had collected in different parts of the island by her own personal solicitation about 600*l.* She was most unremitting in doing good. Any sentiment of admiration for her dignity, piety, and benevolence which was entertained towards her in this country was amply justified by what she was doing in her own. He could only say he had felt it a great honour to be permitted to communicate matters which he felt to be a very trifling addition to our scientific knowledge. He felt it was a sacred duty everywhere to encourage the diffusion of useful knowledge, and especially of those sciences which enabled us to understand something of the world on which we lived. He felt a minister of religion was in his right position when he was doing all he could to advance the interests of science.

3.—*On the Cape York Peninsula, Australia.* By Dr. A. RATTRAY, M.D., R.N.

THE triangular peninsula which forms the north-east corner of Australia is scantily peopled by small scattered tribes of aborigines. Their number has been variously estimated at from ten to fifteen thousand. They subsist on fish, turtle, roots, fruits, &c.; have no knowledge of agriculture; lead a lazy inactive life; never build huts, but sleep in the open air; have strong migratory propensities; and apparently a total disbelief in a Superior Being or God of any sort: characters which give them a claim to be regarded as among the lowest and most degraded of the human race; although, towards Cape York and the islands of Torres Strait, there is an evident Papuan admixture, and a correspondingly augmented intelligence.

Separated from the main mass of tropical Australia by the Gulf of Carpentaria, which so deeply indents the north coast, this peninsula, 300 miles wide at its base and over 400 miles long, stretches boldly north till within 10½ degrees of the Equator, washed on both sides by sea, and separated from New Guinea by Torres Strait, only 90 miles wide. Its east coast is skirted from 15 to 50 miles off by a steep submarine wall of coral, termed the Great Barrier-reef. This forms an admirable natural breakwater, and leaves a long passage, often calm as a lake, between it and the shore, along which vessels may proceed to Torres Strait without passing through the reef; and moreover possesses numerous openings or gaps through which those who prefer the rival but rougher outer passage may sail, to make their desired exit into the safer seas beyond.

The rapidly-increasing importance of Australian commerce with India and China gives to Torres Strait and the not yet thoroughly appreciated inner and outer Barrier-reef routes, an interest that they would not otherwise possess. Their advantages and disadvantages are well pointed out in the Admiralty Sailing Directions, and the great question, still unsettled practically, appears to be, which is preferable for sailing ships and which for steamers. The easier course is unquestionably through the open coral-sea, and the navigation of the long tortuous river-like track inside the barrier the more intricate. It is this that causes so many merchantmen to prefer the former, in which the short cut through the reef is the only period of anxiety. But it is during this brief run of two or at most three days, whether through the Raine Island or Bligh's entrance, in which so many vessels are wrecked. Now, why run such risk when it might be avoided?

The triennial trips of H.M.S. *Salamander* up and down the inner route during the past three years whilst protecting Somerset, ought to prove the ease with which it may be traversed under sail or steam in its whole length, including its most intricate portion near Torres Strait, even in dark nights. Although its navigation has been materially benefited by the beacons placed by H.M.S. *Salamander* where most wanted, it might be still further improved. But even now, could merchant mariners, both under sail and steam, be prevailed on to make trial of what is little else than coasting throughout, they would soon prefer it. When rendered safer, and a better class of mail steamers is employed, the inner passage will doubtless become a favourite route to Asia and perhaps to England.

Nowhere will the traveller meet with finer views than in the lower part of the Cape York Peninsula, especially in the vicinity of Cape Tribulation. Here the mountain range which begins near Cape Howe and runs northward skirting the coast and forming the backbone of Eastern Australia, culminates in the curiously peaked "Peter Botte" at a height of 3311 feet, whose sloping sides, wooded from base to summit, deep well-timbered gorges and valleys luxuriant with vegetation, all indicate great fertility of soil. Thence onward, the hills of the now rapidly narrowing peninsula, which still skirt its eastern border from 5 to 30 miles inland, gradually decrease in height, become more irregular and broken as a range, while the land shows less fertility and appears more barren and bare, till, near Cape York, they terminate in a series of undulating downs, of which the highest is not more than 300 feet above the sea-level.

The range which thus traverses the entire length of this peninsula consists, as it does further south, of an axis of crystalline rocks, chiefly of granite, porphyry, gneiss, felspar, and quartz, resting on the eastern and western flanks of which are thick strata of sandstone of the carboniferous age. As yet, however, no gold-bearing gullies or creeks have been found in the former system of rocks, like those of the richly auriferous regions of Victoria, New South Wales, and the Peak Downs, nor copper-mines like those of Burra-Burra, nor valuable and extensive coal-beds in the latter. No coal has been discovered further north than Port Denison. Lying between the volcanic rock and the super-imposed ironstone of the vicinity of Somerset and the adjacent Albany Island, we find a more local and limited deposit, consisting of a coarse quartzoze sandstone, unfit for permanent building purposes. Iron is thus the only known mineral wealth of this peninsula.

Climate is another influence likely to affect the colonisation of the Cape York district. It is therefore important to ascertain its nature, and whether it is healthy or the reverse. Lying between the 10th and 17th parallels of south latitude it is entirely tropical. A line drawn obliquely across the peninsula from Cape Flattery to the bottom of the Gulf of Carpentaria forms a marked division inasmuch as all to the northward lies in the monsoon district, and all to the southward in the trade-wind region. In both, the year may be divided into the wet and dry seasons; and if we confine our attention to Somerset and the monsoon portion we find that the former corresponds with the north-west and the latter with the south-east monsoon. Variable winds and other atmospheric vicissitudes prevail as the one monsoon merges into the other; a period which the natives, who, according to Macgillivray, divide the year into three, term the Malgui or change; the others being Aibu or fine weather, and Kuki or wet weather. This region, in fact, forms the south-east corner of the great monsoon quadrilateral of the Indian Ocean, and the imperfect development of the north-west wind over this peninsula is doubtless due to its limited area, which forms a circumscribed heating surface, the influence of which is still further modified by proximity to the extensive sheets of water which bathe it on either side. If this peninsula did not exist there would be no north-west monsoon, and the south-east wind, which now prevails for nine or ten months, would blow all the year through. On the other hand, the unusual length of the south-east breeze is due to the warming influence of the sub-equatorial surfaces of the huge islands of the Indian Archipelago and their shallow inter-insular seas, which strengthens what may in fact be regarded as an intensified south-east trade. The highly developed periodic winds of India and China are totally distinct from the less decided ones of Australia. The two, however, come in close contact at the Equator; but necessarily blow, as the corresponding trades do, in different directions and with dissimilar force. Thus, while those of India are S.W. and N.E., those of North Australia are S.E. and N.W., owing to the relative position which the land on either side bears to the central sea. Moreover, while the south-west monsoon of the northern hemisphere prevails during the same months as the south-east of the southern continent, the former is rainy and the latter dry: while, on the other hand, the opposite or north-east monsoon of India blows during the same part of the year as the north-west of Australia; but the former constitutes the dry and the latter the moist or rainy season. Thus in either hemisphere it is the breeze which blows from the Equator, *i. e.*, the warmest part of the Indian Ocean, to the north or south respectively, which is the rainy wind, and that which comes from landward the dry breeze.

Two peculiarities in the south-east trades and monsoons of north-east Australia are worthy of notice. Beyond a certain distance from the land they preserve their proper course; but those which impinge on the coast, on coming in contact with the mountain range which closely skirts it, take more or less the trend of the land, which however has a general south-east and north-west direction, and hence vary with every headland and bay. The still loftier chain, which traverses Papua in a line nearly perpendicular to this, has doubtless a similar influence on these south-east winds: and here we have a solution of the problem why this monsoon increases so much in strength as it nears Torres Strait. The convergent coasts of the Cape York Peninsula and New Guinea form a funnel which has this narrow channel as an outlet, through which the pent-up air rushes with great force, especially during July, August, and September, when the heating power of the sun on the high land and shallow-sea surfaces of the Indian Archipelago is apparently greatest. After passing through this strait, the breeze again spreads out and blows less strongly in the Arafura Sea, where its humidity, markedly augmented on the eastern side, also decreases.

The period of change of the monsoons of Torres Straits varies considerably in different years; and to ascertain the exact or probable time is not only a matter of great scientific interest, but of by no means light importance in a mercantile point of view, in connexion with the traffic between our Australian colonies, India, China, and England.

In the dry season the thermometer ranges from 61° to 85° (shade), and during the wet from 75° to 90° Fahr. The annual range is about 28°, and the average annual temperature 78° Fahr. The rainfall varies considerably in different years, both in the wet and dry seasons. In 1866 it amounted to 103 inches, during the previous twelve months to considerably more, and in 1867 very much less. Fogs and mists are only common in the wet monsoon, when thunder and lightning are also frequent, with squalls and heavy rains. The electric explosions, however, are seldom near the earth, but usually distant and dully heard high overhead in the dense masses of rain cloud, and unattended with such danger to life and property as in Queensland, where the altitude is often less, and deaths therefrom by no means rare.

It will thus appear that here, as elsewhere, various influences combine to form and modify the winds and climate of the Cape York Peninsula. Proximity to the sea is one of the greatest of these. The effect of shallow waters in tropical regions, not only in raising the temperature of the air, but in producing currents both in the aërial and aqueous oceans, does not appear to be sufficiently appreciated by physical geographers. Near a beach in the vicinity of Somerset, I found the temperature of the sea 200 yards from the shore, where the water was 54 feet deep, to be 82½° Fahr.; *i. e.*, half a degree above the air (82° Fahr.); while 5 feet from the shore, where the depth was only half a foot, it was 84¾° Fahr.; in other words, 2¼° Fahr. higher. Now much of the Torres Strait region, which embraces an area of several hundreds of square miles, consists of coral-reefs and shoals, dry at ebb, and covered by only a few feet at high water, the heating of which by the sun overhead necessarily raises the temperature of the atmosphere, and creates an indraught of colder air; which, conjoined with other causes already explained, is the reason why the south-eastern monsoons increase in force as we approach this strait: and also why rainy south-west winds occur during the north-west monsoon. Originally, humid north-west winds, which, according to Maury, are merely the north-east trades of the northern hemisphere deflected, they reach the shallow highly heated Gulf of Capentaria, which renders them, if possible, still more humid, and here come under the influence of the indraught, caused by the still shallower waters eastward of Cape York, towards which they turn. The deflection seriously influences the meteorology of the western portion of the Cape York Peninsula and adjacent part of the gulf, which get little of the moisture these north-west winds would bring, as also happens with the south-east trades and monsoons; and hence it is why much of this land is parched, cheerless, scantily vegetated, and characterized by a climate with irregular light winds, frequent calms, and alternate thunder-storms. In the shallow seas which lie between the north coast of Australia and Asia, and bathe the numerous islands of the Indian Archipelago, we have a still more extensive heating surface, which warms sooner and more highly, and preserves its temperature better than the far deeper Pacific and Indian Oceans on either side. And it is to this, conjointly with the caloric emanating from the land surfaces, that the position of the thermal equator, which runs through this region, is due. This is the only part of the globe where it lies to the southward of the physical equator; and nowhere does it take a greater bend than here, in curious contrast to the isotherm of Sydney, which is perhaps the straightest of all isotherms. Beyond Java the thermal equator again takes a very large north-ward curve as the influence of this district declines, and the effect of the extensive continent of Asia comes into full and unopposed play. It is to the less favourable circumstances in which Port Essington, situated in the same latitude, but 600 miles further west, is placed, which makes its average annual temperature 5° Fahr. higher than that of Somerset; viz., a greater land surface behind it, conjoined with the slighter cooling influence of its weaker south-east monsoon, and the higher heating effect of its stronger and more prolonged north-west winds. And, again, it is because still more advantageously situated close to the sea, to a cold coast current, and the lofty Andes, that Callao and Lima, which lie in about the same latitude of the opposite shore of the Pacific, enjoy a temperature 5° Fahr. under that of Somerset (73° Fahr.).

The ocean-current tides and prevalent winds also greatly affect the climate of this region. Rossel's drift, which near Cape York, forms a one-knot current, warmed in a lengthy circuit of several thousand miles among the islands of the South Pacific, in a subtropical latitude, has necessarily become a warm stream long ere it reaches the vicinity of Torres Strait, especially during the northwest monsoon season, when the sun is in the southern hemisphere, and hence overhead, when the heat of its waters is usually only a few degrees either above or below that of the air. This doubtless tends slightly to raise the average annual temperature of Somerset, but acts still more in equalising and limiting it. The effect of the strong three or four knot tidal currents which set through Torres Strait either way, on the climate, is not very apparent; but they probably have a cooling, or rather an equalising influence, and act by mixing the surface waters as they become heated with the cooler layers below, so as to reduce the temperature of the whole, and indirectly decrease that of the air overhead, heated principally by radiation. If no such tides and currents existed, we may conceive how warm these shallow waters would become, how hot the air over them, and how sultry the climate. Again, the influence of the south-east trades and monsoons in reducing the temperature is very marked. Coming cool and moisture-laden from the South Pacific they render the winter enjoyable, while without them the heat would be much more oppressive and unhealthy than it is. Move out of the breeze, and the atmosphere becomes hot and stifling in the full glare of the sun. Their temporary cessation, during the morning and evening calms, often illustrates this, and makes their value in tempering this season very apparent. On the other hand, the effect of the humid north-west winds is to render the weather sultry, debilitating, and sickly.

The physical features and geology, not only of this peninsula, but of Australia as a whole, necessarily influence the temperature, winds, and rainfall. From the extensive flat, arid, and almost rainless interior come the dry south-west winds prevalent in the Albert River district, and adjoining base of the peninsula as far north as the Mackenzie River. The deflection of the south-east winds by the mountains which traverse the peninsula, and of the north-west monsoon by the furnace-action of Torres Strait, accounts for the great difference in the climate to the east and west of the range, as well as for the character of the vegetation in its badly watered western and better supplied eastern slopes and adjacent country. While, again, it is the rapid decrease, both in height and area, of the peninsula that causes the slight rainfall of its northern part during the south-east monsoon, the fewness and unimportance of its streams, its parched soil, and its scanty and imperfectly tropical vegetation.

The characteristic aspects of the wet and dry seasons at Somerset are widely different; nor is this more marked in the inanimate world than in the animal and vegetable kingdoms. As in the tropics generally, there is here no real winter, and throughout the year perpetual summer seems to smile. Nothing can be more wonderful than the difference noticeable, even in a few days, after the advent of the north-west monsoon, with its profuse and invigorating rains; grasses, ferns, &c., soon shoot forth, and grow with amazing rapidity; buds sprout and flowers bloom, till soon the whole country, profusely covered with vegetation, and clad in a gorgeous robe of bright green, variegated with gay flowers, assumes more the aspect of a tropical land, than during the more lengthy dry south-east monsoon, and yields a strong contrast to its late parched, cheerless character. In this change the animal kingdom participates. From every crevice in the perforated ironstone rock, every hole burrowed in the hard, stony soil, scorpions and lizards come forth, and snakes, *e. g.*, the carpet-snake, often 12 feet long, and the rarer common brown snake and death adder; while occasionally the huge gavial, 20 or 25 feet long, tempted from the not far distant muddy and mangrove-fringed bays which lie towards Cape York, shows its serrated back, as it floats lazily with the tide through the adjacent Albany Pass; or the ungainly sun-fish, as it swims along with the peculiar fan-like motion of its dorsal and ventral fins. The air is alive with the hum of the native bee, the chirp of the cricket, and the song or cries of pairing birds, among which the black cockatoo, the common yellow-crested white cockatoo, the parraqueet, the rare and beautifully plumaged rifle-bird (*Ptilorus magnificus*), and a pretty migratory wood-kingfisher (*Tanysiptera sylvia*) are especially noticeable. Soon after the cessation of the rain, however, the flowers wither. The lacertæ and ophidiæ return to their subterranean haunts to hybernate; the few migratory birds which annually visit Cape York from New Guinea and the intervening islands are no longer seen; the ground becomes more and more parched; the streamlets occasionally met with in the gullies during the other monsoon now dry up; while the few streams in the neighbourhood dwindle down to a low ebb.

On the salubrity of Somerset will depend much its future as a field for successful settlement, and the number and class of emigrants likely to resort thither. Those of European extraction wisely prefer a healthy, and if possible a cool climate; and if that of this region is both sickly and sultry, it will probably influence the prospective population, by limiting the influx of the white races: and leading to the emigration of Chinese, Malays, South Sea Islanders, &c., in whom exposure to solar heat causes neither inconvenience nor risk to health, and by whom heavy out-door work may be done. Extra-tropical Australia is rightly regarded as one of the healthiest of our foreign possessions, and well adapted for the European constitution. But does this hold good with regard to the warmer Cape York district? The insalubrity of Port Essington first led to the belief that inter-tropical Australia was unhealthy as *a whole;* an idea which that of the Albert River district, at the bottom of the Gulf of Capentaria, appears to confirm. There is little doubt, however, that in both instances this is exceptional, arises purely from local causes, especially proximity to marshy land, and does not extend to the whole of the north coast.

For at least eight or nine months of the year the climate of Somerset and entire eastern coast is fine for a tropical latitude. Moreover, no malarious or other local influences exist to render either of them unhealthy, and hence the climate at this season is remarkably genial for so low a latitude. The remaining three or four months of the rainy season are both less pleasant and healthy, and though the young and vigorous may withstand, perhaps for some years, the debilitating influence even of this trying period, various ailments are apt to occur, especially among the enfeebled. We find here no exception to the great law, that change from a cold to a warm zone is sooner or later inimical to health, and may prove productive of disease if not mortality in the white constitution, which attains its most perfect development, highest health, and longest life, only between the lines of the fortieth and forty-fifth degrees of north or south latitude. Occasionally the young and vigorous appear to flourish and even fatten for a time, but with the majority the reverse is the case. The climatic effect observable in the 240 sheep taken north from Brisbane, to supply Somerset on its first settlement, is interesting and tends to support this opinion. Under the withered herbage of the dry season, a scanty water-supply, and the hot atmosphere, they diminished in bulk to an average weight of 25 lbs. After the advent of the wet season, however, with its profuse succulent herbage, they soon gained in weight. But, half-starved thus for eight months, and overfed during the remainder of the year, a result otherwise than injurious to the breed, both as to carcass and wool, could not be expected. The wool of New Zealand, New South Wales, and other colonies of extratropical Australia, is decidedly superior to that of Northern Queensland; and it may be laid down as a law, that the warmer the climate the more degenerate the fleece.

From this review it will be obvious that the capabilities of the Cape York Peninsula, and its solitary township Somerset, are not of the most promising nature, and that we must not be too sanguine as to the future of either. But this may not, and probably does not hold good with regard to Tropical Australia as a whole; and the more extensive and better watered tract which lies to the west of the Gulf of Carpentaria, in which there appears to be both unlimited latitude for settlement and a more promising soil, may yet prove a valuable part of this southern continent, and be in some respects the India of Australia.

This paper will be printed entire, with map, in the 'Journal,' vol. xxxviii.

The PRESIDENT said this paper was one of the many proofs we had had of the scientific abilities of our naval men employed upon the eastern coast of Australia. He would not allude to all that Captains Stanley, Blackwood, or Richards had done upon that coast. He regretted that Captain Richards, the hydrographer, was not present to state what he knew of the researches of Dr. Rattray, who, on board the *Salamander*, employed himself in investigating the physical geography, climate, natural history, and currents, in a way similar to that which Charles Darwin did when accompanying Admiral Fitzroy in his great explorations in the *Beagle*. The manner in which the paper had been put before them must have made all aware of the great qualifications of Dr. Rattray; especially the beautiful manner in which he had brought out the effect produced by the configuration of land and sea upon the nature of the climate. Before calling attention to another small paper which was to be read, he begged to inform the Society that the Council had determined upon applying to her Majesty's Government, through the Secretary of the Colonies, to contribute by their influence and recommendation to the exploration of Australia, from north-east to south-west, across the whole continent, as proposed by Dr. Neumayer at the last meeting. The expedition was to include several men of science, and was to be provided with a number of horses and camels; and to be, in short, the greatest and most important Australian expedition ever attempted. The expense would fall on the colonies, and, from the spirit which animated their governments, he was earnestly hopeful that they would readily acquiesce in the proposal. But it was desirable that scientific Societies like their own, and the Royal Society in particular, should lead the way in recommending this project. The Council of the Geographical Society had accordingly represented to her Majesty's Government the desirability of approving and recommending to the colonial governments the adoption of this great traverse. Dr. Neumayer intended to fall, in latitude 23°, into what he believed to be the principal watery region of Australia, where he can find subsistence; and he had so arranged his journey by stoppages at certain stations, that when he arrived at the central point which Macdougall Stuart reached, he would be able to obtain any supplies that might be required from Adelaide. It was hoped that he would come out at Swan River. This great project had been warmly approved by the Council of the Society.

The PRESIDENT further added that there was one other subject to be noticed at this meeting: it was only mentioned to him that morning by Professor Tennant. There had been discovered in our own settlements on the Orange River, to the north of the Cape of Good Hope, some valuable diamonds. Two of them, which he had seen himself, were now in the possession of Messrs. Garrard. One of them Professor Tennant told him was worth 400*l*., and another 200*l*. This was a new geographical fact as to the distribution of mineral matter, and he was glad that Professor Tennant had this opportunity of placing it on record in the 'Proceedings' of the Society.

4.—*On the Discovery of Diamonds at Hope Town in the Cape Colony.*

By PROFESSOR J. TENNANT, F.R.G.S.

PROFESSOR Tennant said he had listened with great attention to the last address of the President of the Society, and had ventured to suggest an omission, viz. the finding of diamonds in a new locality—the Cape Colony. He considered the subject of such importance that it ought to be brought before one of our scientific Societies. Two of these diamonds had been some months in London, and were at present in the possession of Messrs. Garrard, jewellers to her Majesty, in the Haymarket, but have been bought by Sir Philip Wodehouse. He saw the first on the 8th of August, 1867; it is in the shape of an octohedron, measuring in one direction three-quarters of an inch and in the other three-eights, being therefore a compressed crystal; it presents a yellowish tinge of colour, and weighs $21\frac{1}{8}\frac{1}{32}$ carats. This was found at Hope Town on the Orange River, Cape of Good Hope.

The second is an octohedron, more symmetrical, and was found June 7th, 1867. It weighs $8\frac{18}{16}$ carats; specific gravity, 3·54.

He had been as brief as he possibly could, simply with the view to place the fact on record. He had been told that six other diamonds had been found. These he had not seen; but on good authority he could believe that four of them were genuine. He was told that the first stone was treated in the usual careless manner. People stated that it was so hard as to resist the blow of a hammer: they took it to a blacksmith, who placed it on an anvil, and struck it with a hammer. He need scarcely say what was the result: the diamond was broken into a thousand pieces, and was, therefore, perfectly useless. It was a generally received opinion that the diamond, in consequence of its extreme hardness, would resist a blow of this kind. This was altogether a mistake. There was not a more brittle substance in nature than the diamond; although so hard as to scratch all other substances, it was, at the same time, so extremely brittle that he should be sorry to let a valuable diamond fall upon the floor. The symmetrical figure of the smaller specimen was well adapted for producing a diamond of the first brilliancy. It was composed actually of two crystals, and by cutting off a point it would produce one of the most brilliant diamonds, probably, that we had. It would be small in size, but in its present state it was worth 200*l.* The other, if placed upon a half-sovereign, would not project over its rim. It was a trifle over the weight of a half-sovereign, and the intrinsic value of it was a thousand times greater than the value of that coin.

The PRESIDENT, after congratulating the Fellows on the success of the past session, and hoping that the Society might be supplied in the ensuing session with equally important and interesting matter, adjourned the meetings to the month of November.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *A Description of the Banda Islands.* By ALBERT S. BICKMORE, M.A.

ON the 5th January, 1865, I sailed from Boston for Batavia, with the hope of being able to reach the Moluccas, and re-collect the shells figured in Rumphius' 'Rariteit Kamer.' On the 1st of May I arrived at Batavia, where I was honoured, by his Excellency the Governor-General of the Netherlands India, with an order to all the officers in the Dutch possessions in the East to receive me kindly and aid me in every possible manner. Thence I proceeded along the north coast of Java to Macassar, the capital of Celebes, and thence southward through Sapi Strait between Sumbawa and Flores, and eastward to Kupang, at the southern end of Timur. From Kupang I passed northward along the western shore of Timur, and crossing the Banda Sea arrived at Amboina, the capital of the Spice Islands, or Moluccas.

Here, thanks to the privileges secured to me by the order of the Governor-General, and to the kind assistance offered me by every official, in three months I accomplished all, and even more than I had dared to plan, and was prepared to visit some other part of the Archipelago, and turn my attention to some other branch of natural history.

During all the time I had been gathering, arranging, and packing my collections, Mr. Arriens, the governor of those islands, had frequently honoured me with a visit. He now called again, this time to give me a pleasant surprise. He had a fine steam yacht of 300 or 400 tons. It was necessary that he should go to Banda, and he took it for granted that I would accompany him; and when we returned, the yacht would take me through a large part of the Archipelago north of Amboina,—a royal programme.

On the 7th of September we steamed down the magnificent bay of Amboina for Banda. Our company consisted of the Governor, who was on a tour of inspection, myself, and an "officer of justice" and lieutenant, with a detachment of soldiers, who had in custody a native of Java, that was sentenced to be hung as soon as we should reach our destined port.

The worst of the rainy season along the south coast of Ceram was now over, and the evening was cool, clear, and delightful. Early the next morning Banda, or more properly the Bandas, were in full view. They are ten in number; the largest, Lontar, or Great Banda, is a crescent-shaped island, about six miles long and a mile-and-a-half wide in its broadest parts. Its eastern horn curves towards the north, and the other points to the west. In a prolongation of the former lie Pulo Pisang, "Banana Island," and Pulo Kapal, "Ship Island." The first is only about two-thirds of a mile long and half as wide, and the last is merely a high rock, resembling the poop of a ship, hence its name. Within the circle of which these islands form an arc, lie three other islands. The highest and most remarkable is the Gunong Api,* or "Burning Mountain," apparently attaining a very considerable elevation, because its sides rise so abruptly up from the sea. Between the Gunong Api and the northern end of Lontar lies Banda Neira, about two miles long and less than a mile broad. North-east of the latter is a small rock called Pulo Krakka, or "Women's Island." The centre of the circle of which Lontar is an arc, falls in Sun Strait, a narrow passage separating Gunong Api from Banda Neira. The diameter of this circle is about six miles. Without this another concentric circle may be drawn, which will pass through Pulo Ai (Wai), "Water Island," on the west, and Rosengain on the south-west; and outside of this a third concentric circle, which will pass through Pulo Swangi, "Sorcery," or "Spirit Island" on the north-west, Pulo Run (Rung), "Chamber Island," on the west, and the reef of Rosengain on the south-west. The total area of the whole group is only 17·6 geographical square miles.

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* This Gunong Api must not be confounded with another similar volcano, of the same name, north of Wetta, and still another near the western end of Sumbawa, at the northern entrance of Sapi Strait.

The first European who reached these beautiful and long-sought islands was d'Abreu, a Portuguese; but he cannot properly be called their discoverer, for the Arabs and Chinese, and probably the Hindus, had been trading here for years before his arrival, and De Barros informs us that "d'Abreu (while on his way from Malacca) touched at Gresik, in the eastern part of Java, to procure Javanese and Malay pilots, who had made this voyage." Barros further adds:* "every year there repair to Sutatam (Lontar) Javanese and Malays to load cloves, nutmegs, and mace, for this place being in the latitudes most easily navigated, and where ships are most safe, and as the cloves of the Moluccas are brought to it by vessels of the country, it is not necessary to go to the latter in search of them. In the *five* islands now named—Lontar, Rosengain, Ai, Run, and Neira—grow all the nutmegs consumed in every part of the world. A proof of the correctness of Barros' statements is seen in the names of the different islands mentioned above, for they are all of Malay or Javanese origin. The aboriginal population at that time is given at 15,000, which, if correct, would have made this group far more densely peopled than any other island or number of islands in the whole archipelago at the present day.

Our fast yacht rapidly brought us nearer over the quiet, glassy sea. This is Pulo Ai on our right. It is only from 300 to 400 feet high, and, as we see from the low cliffs on its shores, is mostly composed of coral rock. This is also said to be the case with the other islands outside of the first circle, and we notice that they are all comparatiely low.

We now change our course to east, and steam up under the high, steep Gunong Api. On its N.N.W. side, about one-fourth of the distance from its summit down to the sea, there is a deep wide gulf, out of which rise thick, opaque clouds of white gas, that now, in the still clear air, are seen rolling grandly upward in one gigantic expanding column to the sky. On the top, also, thin clouds occasionally gather, and then slowly float away like cumuli, dissolving in the pure ether. These cloud masses are chiefly composed of steam and sulphurous acid gas, and, as they pour out, indicate what an active laboratory there is within the bowels of this volcano.

The western horn of crescent-shaped Lontar is before us. Its shore is composed of a series of nearly perpendicular crags, 200 or 300 feet high; but on the north side the luxurious vegetation of these tropical islands does not allow these rocks to remain naked, and from their horizontal crevices and upper edges hang down thick wide sheets of a bright green unfading verdure. The western entrance to the harbour, through which we are now passing, is between the abrupt magnificent coast of Lontar on the right, and the high, overhanging peak of Gunong Api on the left, and, as we advance, these separate and open to our view the steep lofty wall that forms Lontar's northern shore. This is completely covered with one dense matted mass of vegetation, out of which rise the erect columnar trunks of palms, from whose crests, as from sheaves, long feathery leaves hang over, and slowly and gracefully oscillate to and fro in the slight air which we can just perceive fanning our faces. Now Banda Neira is in full view. It is composed of hills, which gradually descend to the shore of this little bay. On the top of one near us is Fort Belgica, in form a regular pentagon. At the corners are bastions surmounted by small circular towers, so that the whole exactly resembles an old feudal castle. Its walls are white and almost dazzling in the bright sunlight, and beneath is a broad neatly clipped glacis, forming a beautiful, green, descending lawn.

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* *Vide* "Barros" in Crawfurd's complete and accurate work, 'Dictionary of the Indian Islands.'

Below this defence is Fort Nassau, which was built by the Dutch when they first arrived in 1609, only two years before the foundations of Belgica were laid, and both fortifications have existed, much as they are now, for more than two centuries and a half. To the right and left of this fort extends the chief village, Neira, with rows of pretty shade-trees on the bund, or front street bordering the bay. Its population is about 2000, and that of the whole group between 6000 and 9000.

In the roads were a number of praus from Ceram; odd-shaped vessels, high at the stern and low at the bow, and, instead of a single mast, a tall tripod, which can be hoisted or lowered at pleasure. They were all poorly built, and it seemed a wonder that such awkward boats could live any time in a rough sea. A number of Bugis traders were also at anchor near by. They are mostly hermaphrodite schooners, carrying a square-sail or foresail, a fore-topsail, and a fore-royal, and evidently designed like the praus to sail only before the wind. They visit the eastern end of Ceram and the western and south-western parts of New Guinea, the Arru group, and all the thousand other islands between Banda, Timur, and Australia. When the mail steamer that took me to Amboina touched here, a merchant of this place, who joined us, brought on board four large living specimens of the *Paradisea apoda*, or Great Bird of Paradise, which he had purchased a short time before from one of these traders, and was taking with him to Europe.* They were all very sprightly and in superb condition, and their colours had a bright, living hue, incomparably richer than the most magnificent specimens I have ever seen in any museum.

At our main truck a small flag slowly unfolds, and displays to those on shore a red ball. This indicates that the Governor is on board, and soon a boat comes off to take us to the village; but as business is not very pressing, as is usually the case here in the East, we prefer to conform to the established custom in these hot lands, and quietly enjoy a siesta instead of obliging our good friends on shore to come out in full dress and parade in the scorching sunshine.

Our first excursion was to the western end of the opposite island, Lontar, —the Malay name of the Palmyra palm, *Borassus flabelliformis*, whose leaves were used to write upon over all the archipelago before the introduction of paper by the Arabs or Chinese; and in some places even at the present time. Lontar, as already noticed, has the form of a crescent. Its inner side is a steep wall, bordered at the base with a narrow band of low land.

On its outer side, from the crest of the wall many radiating ridges descend to the sea, its south-western shore is a series of little points separated by small bays. The whole island is merely one continuous forest of nutmeg and *canari*-trees. The nutmeg-tree, *Myristica moschata*, belongs to the order *Myristicaceæ*. A foot above the ground the trunk is from 6 to 10 inches in diameter. It branches somewhat like the laurel, and its topmost sprays are frequently 50 feet high. It is diœcious, that is, the pistils and the stamens are borne on different trees, and of course some trees never bear fruit. The fruit, or *drupe*, before it is fully ripe, in size and form very closely resembles a peach that has not yet been tinged with red; but this exterior is only a thick fleshy rind (*epicarp*) which soon opens into two equal parts; and within is seen a spherical, black, polished nut, surrounded by a finely branching aril—the "mace"—of a bright vermilion. In this condition it is probably by far the most beautiful fruit in the whole vegetable kingdom. It is now picked by means of a small basket fastened to the end of a long bamboo. The outer part being removed, the mace is carefully taken off and dried on shallow bamboo baskets in the sun. During this drying process its bright colouring changes to a dull yellow. It is now ready to be packed in casks and sent to market.

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* I afterwards learned that two of them were still living when he reached France.

The black, shining part seen between the ramifications of the vermilion mace is really a shell, and the nutmeg is within. As soon as the mace is removed, these black nuts are taken to a room and spread on shallow trays of open basket-work. A slow fire is then made beneath them, and here they remain for three months. By the end of this time, the nutmeg has shrunk so much that it will rattle in its black shell. The shells are now broken, and the nutmegs sorted and packed in large carefully-made casks of *jati*-wood, and a brand is placed on the head, giving the year the fruit was gathered and the name of the plantation or "park" where it grew.

From Neira a large cutter took us swiftly over the bay to Selam,—a small village containing the ruins of the old capital occupied by the Portuguese during the sixteenth and early part of the seventeenth centuries, while their rights remained undisputed by the Dutch. This western end of Lontar is about 400 feet high, and is composed of coral rock of very recent date. Walking eastward we next came to a conglomerate containing angular fragments of lava. This was succeeded on the shore of the bay by a fine-grained, compact lava, somewhat stratified, and this again by trachytic and basaltic lavas. Indeed nearly this whole island is composed of such eruptive rocks, and Lontar may be regarded as merely a part of one immense crater about 6 miles in diameter, if it were circular, though it may have been more nearly elliptical. Pulo Pisang and Pulo Kapal, already noticed as falling in this circle, are two other fragments of the old crater walls—all the rest have disappeared beneath the sea. Here then, is another, enormous crater, greater even than that seen among the Zeugger Mountains on the eastern end of Java, whose minor and major axes severally measure *three miles and a half* and *four miles and a half*, and whose floor of naked sand is well named by the Malays "the Sandy Sea." Banda Neira represents the extinct craters rising in that Sandy Sea, and Gunong Api has a complete analogue in the still active Bromó. The enclosed bay, where vessels now anchor in 8 or 9 fathoms, is the bottom of this old crater, and, like that in the Zeugger Mountains, is composed of volcanic sand.

The radiating ridges on the outer side of Lontar represent the similar ridges on the sides of every volcano that is not building up its cone by frequent eruptions at its summit.

Lastly, the islands crossed by the second and third circles are so many cones on the flanks of this great volcano. True, those parts of some of them now above the sea are largely composed of coral rocks, like the west end of Lontar; but undoubtedly the polyps began to build their massive walls on the shores of islands of lava rock. They are doing this at the present moment. Every island in the group is now belted with a fringing reef, except at a few places where the shore is a perpendicular precipice, and the water of great depth. The western entrance through which we came to the roads is already quite closed up by a broad reef of living, growing coral.

A stroll through these beautiful groves, particularly at such a time, would be one of the richest pleasures a traveller could enjoy. All the nutmeg-trees were loaded down with fruit, which is chiefly gathered during this month, September, and again in June, though some is obtained from time to ti throughout the year. It seemed surprising to me that the trees could loaded with fruit season after season; but the official reports show that.

to what has been true of the clove, there has been but little variation in the annual yield of the nutmeg for the last thirty years.

An average crop for the last twenty years has been about 580,000 Amsterdam lbs. of nuts, and 137,000 lbs. of mace. The whole number of trees on Lontar, Neira, and Ai, the only three islands where they are cultivated, is in round numbers 450,000, of which only two-thirds bear fruit. As the Governor remarked to me while I was wondering at the abundance of fruit on every side, it is indeed strange that the income from all this produce does not equal the expenses of the Government in this residency. For this cause the Government proposes to give up the monopoly. Beneath these trees is spread a carpet of green grass, while high above them the gigantic canari-trees stretch out their gnarled arms and shield the valuable trees entrusted to their care from the strong winds which strive in vain to make them cast off their precious fruit before it is ripe. Such good service do the tall canaris render in this way that they are planted everywhere, and when the island is seen from a distance their tops quite hide the nutmeg-trees from view. The roots of this tree are remarkable. They spring off from the trunk above the ground in great vertical sheets, which are frequently 4 feet broad where they leave the tree. These wind back and forth for some distance before they disappear beneath the earth, so that the lower part of one of these old trees might well be fancied to be a huge bundle of enormous snakes struggling to free themselves from the Titanic hands that held them firmly for ever. As we leisurely passed along the crest of Lontar, with a thick foliage over our heads that effectually shut out the direct rays of the sun, we occasionally caught distant glimpses of the blue sea breaking into white, sparkling surf on the black rocks, far, far beneath us.

Soon we came to the "Look-out," known here, however, by the Malay name Drang datang, "the People Come;" for it is a peculiarity of that language, instead of naming a place like this *subjectively*, as we do, that is, from one's own action, to name it *objectively*, that is from the result of that action. This is placed on the edge of the interior wall, and is about 600 feet above the sea. From this point most of the Bandas can be distinctly seen in a single glance; and this view is undoubtedly one of the finest among all the isles of the sea. Before us was Banda Neira, with Neira, its pretty village, and left of this the dark, smoking volcano, and beyond both, on the right, Banana Island, where the lepers live in solitary banishment, and still further seaward Ship Rock, with the swell chafing its abrupt sides, while on our right in the distance were Pulo Ai and Pulo Run. All these rose out of the blue sea, which was only ruffled here and there by light breezes, or flecked by shadows of white fleecy clouds that slowly crossed the sky.

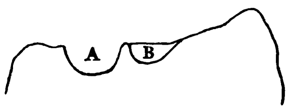
The next day we again went over to Lontar, and walked westward along the narrow band of low land between the base of the old crater-wall and the bay, visiting a number of the residences of the "Perkenniers," or "Park-keepers." Each of these consists of a rectangular area of about a quarter of an acre, enclosed by a high wall. The side next the sea is formed by the proprietor's house, and on the other three sides of the great open yard are rows of store-houses, and the houses of the natives who work on that plantation. Near the place at which we landed was a small area where all the mace is *white*, when the fruit is ripe, instead of red. From the west end of the island we followed most of the distance round its outer shore, and then crossed to our landing.

The Governor having finished his inspecting duties, now proposed that we try to reach the top of Gunong Api. There was only one man—a native—who had ever been to the top, and "knew the way;" though, to judge from a distance, one part of the mountain was just as dangerous as every other. He was engaged as our guide, and some ten others, whose duty it was to carry our lunch and a good supply of water in long bamboos. Early the next morning the coolies were ready. From the west end of the village we crossed the narrow "Strait of the Sun" to the foot of the mountain. Some coolies who had preceded us had cleared a path up the steep declivity, but soon our only road was one of the many narrow tracks, where large masses of rocks and sand, which had loosened from some place high up the mountain, had shot down in a series of small land-slides, ploughing up the low shrubbery during its thundering descent. As long as we climbed among the shrubbery, although it was very difficult and tiring, it was not particularly dangerous until we came out on to the naked sides of the mountain; for this great elevation is not covered with vegetation more than two-thirds of the distance from its base to its summit. This lack of vegetation is caused by the frequent and wide land-slides, and by the great quantity of sulphur brought up to its top by sublimation, and washed down its sides by the heavy rains. Here we were obliged to crawl up on all fours among small, rough, black rocks of porous lava, and here all spread out until our party formed a horizontal line on the mountain side; so that when one man loosened the rocks, as every one was constantly doing, these might not come down and carry away some other man beneath him.

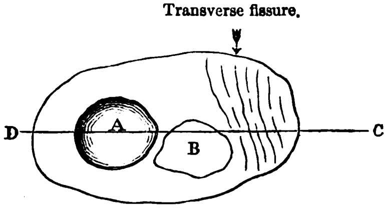
Our ascent now became slow and difficult; but we kept on, though sometimes the top of the mountain seemed as far off as the stars, until we were within about 300 feet of the summit. Here we came to a horizontal band of loose, angular fragments of lava from two to six inches in diameter. The mountain here rose at least at an angle of 35°, and to us, in either looking up or down, it seemed almost perpendicular. This band of stones was about 200 feet wide, and so loose that, when one was touched, frequently half-a-dozen would go rattling down the mountain. I had got about half-way across this dangerous place, when the stones on which my feet were placed *gave way!* This of course threw all my weight on my hands, when at once the rocks which I was holding with the clenched grasp of death also gave way, and I began to slide downward. The natives on either side of me now gave a loud shout, but not one dared to seize me, for fear that I should carry him down the mountain with me. Among these loose rocks a few ferns grew up and spread out their leaves to the sunlight. As I felt myself going down I chanced to roll toward my right side and notice one particularly, and quick as a flash of light the thought crossed my mind that my only hope was to seize *that fern.* This I did with my right hand, burying my elbow among the loose stones with the same motion; and that, thanks to a kind Providence, was sufficient to stop me, otherwise in less than a minute, probably in thirty or forty seconds, I should have been dashed to pieces on the rough rocks beneath me. The whole certainly occurred in a less space of time than it takes to read two lines on this page. I found myself safe, drew a long breath of relief, thanked God it was well with me, and, kicking away the loose stones with my heels, turned round, and kept on climbing. Above this band of loose stones the surface of the mountain was covered with a kind of crust formed chiefly of sulphur washed down by the rains. These rains had also formed many small grooves, and we made better progress here by crawling in these small gullies. At this moment the natives above us suddenly gave a loud cry, and I supposed of course that some one had lost his footing, and was going down to instant death. "Look out! Look out! Great rocks are coming!" and the next instant several small blocks and one great flake of lava two feet in diameter bounded by us with the speed of lightning. "Here is another!" It is coming straight for us, and it will take out one of our number to a certainty, I thought. I had stood up in the front of battle when shot and shell were flying and men were falling, but now to see the danger coming, and to feel that I was perfectly helpless, did, I must confess, make me quiver, and I crouched in the groove where I was climbing with the hope that it might bound over me; and that instant a fragment of lava about a foot square leaped up from the side of the mountain and flew directly over the head of a coolie a few feet on my right, clearing him by not more than five or six inches. I then supposed that the mountain was suffering another eruption, and that in a moment we should all be shaken down its almost vertical sides; but soon the rocks ceased coming down and we continued our ascent, and in a few moments stood on the rim of the crater.

The mystery in regard to the source of the falling rocks was now solved. One of our number had reached the summit before the rest of us, and with the aid of a native had been tumbling off rocks, for the sport of seeing them bound down the mountain, having stupidly forgotten that we all had to wind part-way round the mountain before we could get up on the edge of the summit, and not being able to lean over far enough to see that we were just beneath him.

The whole mountain is merely one great cone of small angular blocks of trachytic lava and black volcanic sand. The crater at its top is merely a conical cavity in this mass. The form of the summit is nearly elliptical, and is approximately given in the accompanying plan and section.



Vertical section along the line C D, i.e., North-west and South-east.



Plan of the area on the summit of the Gunong Api of Banda.
A, " the summit " crater. B, " old " crater.

The depth of the crater is about 80 feet. Its diameter we roughly estimated at from 100 to 150 yards. The area at the top is about 300 yards long, by 200 wide. This is composed of heaps of small lava-blocks, which are whitened on the exterior, and in many places quite encrusted with sulphur. Through these heaps of stones steam and sulphurous acid gas are continually rising, and we soon hurried round to the windward side to escape their suffocating fumes. In a number of these places we were glad to run, to prevent the shoes from being scorched on our feet by the hot rocks.

On the western side of the crater the rim is largely composed of sand, and in one place rises 120 feet higher than on the opposite eastern side. The top, therefore, partly opens out toward the east, and from some of the higher parts of Lontar one can see most of the area on the summit of this truncated cone. In this western part were many fissures, out of which rose sheets and jets of gas. When we had come to the highest point we looked over the north-west side down into the great crater, now active, one-fourth of the distance from the summit down to the sea. Dense volumes of steam and other gases were rolling up, and only now and then could we distinguish the edges of the deep, yawning abyss beneath us. Here we rested and lunched, enjoying meanwhile a magnificent view over the whole of the Banda group, when the suffocating gases were not blown into our faces. Again we continued round the northern side, and came down into an old crater, where we found a large rock with the word 'Etna,' the name of a Dutch warship, cut on one of its sides; and our Captain spent some time carving 'Telegraph,' the name of our yacht, beneath it. Great quantities of sulphur were seen here, more, the Governor said, than he had seen on any mountain in Java; for the great abundance of sulphur they yield is one of the chief characteristics of the volcanoes in this archipelago.

It was now time to descend. We called our guide, but he did not know where we ought to go, everything appeared so different when we looked down, from what it did when we looked upward. I chose a place where the vegetation was nearest the top, and asked him if I could go down there, to which of course he answered Yes, as most people do when they do not know what to say, and must give some reply. I had brought up with me a long stick or kind of alpen-stock, curved at one end, and with this I reached down and broke places for my heels in the crust that covered the sand and small stones. For hundreds of feet beneath me the descent seemed perpendicular, but I slowly worked my way downward for more than a hundred feet, and had begun to congratulate myself on the good progress I was making—soon, I thought, I shall be down *there*, where I can lay hold of that bush and feel that the worst is past—when suddenly I was startled by a shout from my companions who were a short distance on my left. "Stop! Don't go a step further, but climb up just as you went down." I now looked round for the first time, and found to my surprise and alarm that I was on a tongue of land between two deep long holes or fissures, where great land-slides had recently occurred. I had kept my attention so fixed on the bush before me that I had never thought of looking to the right or left, generally a good rule in such perilous places.

To go on was simply impossible, so I turned round, climbed up again and passed round the head of one of these frightful holes. If at any time the crust had been weak and had broken beneath my heels, no earthly power could have saved me from instant death. As I broke place after place for my feet with the staff, I thought of Professor Tyndall's dangerous ascent and descent of Monte Rosa.

At last I joined my companions, who had found the way we had come up; and, after some slips and sprains and considerable bruising, we all reached the bottom and were glad to be off the volcano, and reaching Banda Neira, feel ourselves on *terra firma* once more.

For a few days I could scarcely walk or use my arms; but that lameness soon passed away—not so with the impressions made on my mind by the perils I had so narrowly escaped, and even now, when suddenly aroused from sleep, for a moment the past becomes the present, and I am once more on the tongue of land with a deep gulf on either hand, or I am saving myself again by grasping *that fern*.

The first European who reached the summit, so far as I am aware, was Professor Reinwardt in 1821; the second was M. S. Müller in 1828, and from that time till the 13th of September, 1865, when we ascended it, only one party had attempted this difficult undertaking, and that party was from the steamer *Etna*, whose name we had found on a large rock in the old crater.

The height of this volcano we found to be 707·5 mètres, 2321 feet. Its spreading base occupies less space, 2 miles square. In size, therefore, it is insignificant compared to the gigantic mountains on Lombok, Java, and Sumatra; but when we consider the great amount of suffering, and the immense destruction of property that have been caused by its repeated eruptions, it becomes one of the most important volcanos in the archipelago.

From Valentyn and later writers we learn that eruptions have occurred in the following years:—1586, 1598, 1609, 1615, 1632, 1690, 1696, 1712, 1765, 1775, 1778, 1820, and 1824.

That of 1615 occurred in March, just as the Governor-General, Gerard Reynst, arrived from Java with a large fleet to complete the war of extermination that the Dutch had been waging with the aborigines for nearly twenty years. For some time previous to 1820, many people lived on the lower flanks of Gunong Api, and had succeeded in forming large groves, or, as the Dutch prefer to name them, "parks" of nutmeg-trees. On the 11th of June of that year, just before 12 o'clock, in an instant without the slightest warning, an eruption began which was so violent that all the people at once fled to the shore and crossed in boats to Banda Neira. Out of the summit rose perpendicularly up a great mass of ashes, sand, and stones, heated until they gave out light like living coals. The latter hailed down on every side, and as the accounts say, "set fire to the woods and soon changed the whole mountain into one great cone of flame." This happened unfortunately during the western monsoon, and so great a quantity of sand and ashes were brought over to Banda Neira, that the branches of the nutmeg-trees were loaded down until they broke beneath its weight, and all the parks on the island were totally destroyed. Even the water became undrinkable from the light ashes that filled the air and settled in every crevice. This eruption continued incessantly for *thirteen* days, and did not wholly cease at the end of six weeks.

During this convulsion the mountain was apparently split through in a N.N.W. and S.S.E. direction. The large, active crater, which we saw beneath us on the north-west side of the mountain, from the spot where we lunched, was formed at that time, and another was reported higher up between the new crater and the older one on the top of the mountain. A stream of lava poured down the western side into a small bay and built up a tongue of land 180 feet long. This fluid rock heated the sea within a radius of more than half a mile, and nearer the shore eggs were cooked in it. This lava stream is the more remarkable, because it is a great characteristic of the volcanos throughout the archipelago, that, instead of pouring out fluid rock, they only eject hot stones, sand, and ashes, or mud—that is, water mingled with sand and ashes,—such materials as are thrown up in those volcanos where the eruptive force is known to have attained its maximum and to be becoming weaker and weaker.

On the 22nd of April, 1824, while Governor-General Van der Capellen was entering the roads an eruption commenced, just as had happened 209 years before, on the arrival of Governor-General Reynst. A great quantity of ashes again rose upward from its summit, accompanied by clouds of "black smoke," in which lightnings darted, while such a heavy thundering rolled forth that it completely drowned the salute from the forts on Neira, in celebration of the Governor's arrival. This was followed by a second eruption, succeeded by a rest of fourteen days, when the volcano again seemed to have regained its strength, and once more ashes and glowing stones were hurled into the air, and fell in showers on all sides.

But the people of Banda have suffered quite as much from earthquakes as from eruptions, though the latter are usually attended by slight shocks. Heavy earthquakes, without eruptions, have occurred in 1629, 1683, 1710, 1767, 1816, and 1852.

Almost the first objects that attract one's attention on landing at the village are the ruins of those houses that were destroyed by the last of these fearful phenomena. Many houses had their walls levelled to the ground, but others, that were built with especial care, suffered little injury. These walls are made of coral-rock or bricks. They are two or three feet thick, and covered with layers of plaster. At short distances along their outer side, sloping buttresses are placed against them, so that most of the houses in Banda look more like fortifications than private residences. The first warning that any one had of the coming destruction was that the water suddenly began to stream out of the enclosed bay, and this continued until the war brig *Haai*, which was at anchor in 8 or 9 fathoms touched the *bottom*. Then came in a great wave from the ocean that rose at least to a height of 25 or 30 feet over the low western part of the village, which is separated from Gunong Api by the narrow Sun Strait. Praus lying near this shore were swept up against Fort Nassau, which was so completely engulfed, that it was stated to me that one of these native boats was carried over the walls of the fort, and remained inside when the sea had receded to its usual level. The part of the village over which the flood swept contained many small houses, and nearly every one of them was carried away.

This rapid outpouring of the water from this enclosed bay, or old crater, *was probably* caused either by the elevation of the bottom at that spot, or else by a sinking of the floor of the sea outside, so that this water was drained off into some depression that had suddenly been found. We have no reason to suppose that there was any great commotion in the sea outside, and certainly there was no high wave or bore, or it would also have risen on the shores of the neighbouring islands. There are three entrances or straits which lead from these roads out to the open sea. Two of these are wide, and one is narrow. When the whole top of the volcano, that is Neira, Gunong Api, Lontar, and the area they enclose, was raised for a moment, the water streamed out through these straits, causing very strong currents, but as the land again instantly sank to its former level, the water poured in, and the streams of the two wider straits meeting and uniting, rolled on towards the inner end of the narrow passage. Here they all met, and piling up spread out over the adjoining low village, causing great destruction of life. At the Resident's house, a few hundred yards east of Fort Nassau, the water only rose some ten or fifteen feet above high-water level, and farther east still less. The cause assigned above, therefore, though the principal one, may not have been sufficient in itself to have made the sea rise so high over the south-western part of Neira and the opposite part of Guñong Api, and I suspect that an additional cause was that the land there sank for a moment below its proper level.

Valentyn thus describes another less destructive earthquake wave:—"In the year 1629, there was a great earthquake, and half an hour afterward a flood, which was very great, and came in calm weather. The sea between Neira and Selan (on the western end of Lontar) rose up like a high mountain, and struck on the right side of Fort Nassau, where the water rose nine feet higher than in common spring-floods. Several houses near the sea were broken into pieces and washed away, and the ship *Brill* lying near by, was whirled round three times." In this case, the facts that the water did not pour out of the roads into the sea, and that the "flood" did not come until half an hour after the shock had occurred, indicated that this wave had its origin elsewhere, and there is no need of supposing, as in the case of 1852, that any part of the group was elevated or depressed. However, all these events are but as yesterday, when we look back into the past history of this ancient volcano, for if we can judge by analogy, taking the great crater this day existing among the Zeugger Mountains as our guide, we see in our mind's eye an immense volcanic mountain before us. From its high crater, during the lapse of time, poured out successive overflows of lava, which solidified into the trachyte of Lontar. Then came a period when stones and sand were thrown up, which has not wholly ceased at the present day. During one of its mighty throes, its western half disappeared beneath the sea, if the process of subsidence had gone on so far at that time.

Slowly it sinks, until it is at least 400 feet lower than at the present time, for we found a bank of coral rock on the western end of Lontar at that height. The outer islands are now wholly submerged. This period of subsidence is then followed by one of upheaval, but not till the slow-building coral-polyps have made great reefs, which now become white chalky cliffs, and after many years attain their present elevation above the sea. A tropical vegetation meanwhile by degrees spreads downwards, closely pursuing the retreating sea, and the islands are exactly what we see them to be at the present day.

In 1846, Mr. Jukes announced, as the result of his observations in the southern part of this archipelago, that the whole line of islands eastward from the Strait
o and including Timur, had been elevated within a recent period.
r island my observations, I now find, are quite identical with his.
we learn that elevated reefs are found among the islands eastward
orthern end of Timur, and here they occur again in the Bandas.
f this point, and south-east from Goram, are the Matabello Islands,
rding to Mr. Wallace, are only coral reefs raised 300 or 400 feet.

North-west from the Bandas we come to Amboina. The most recent coral rock which I observed on that island was about 500 feet above the present sea-level. At that elevation many valves of the gigantic *Tridacna gigas* were found considerably decomposed, but always in pairs, as if they had once been partially surrounded with soft coral rock, which, wasting away, had allowed the valves to fall apart. Governor Arriens, who had carefully studied these recent coral reefs, gave me the important fact that he had followed them upward to a height of 800 feet, but not higher, and that at that elevation they seemed to suddenly disappear. At Wahai, on the north coast of Ceram, I found many recent corals, about 50 feet above high-water level, and also at Kayéli Bay, on the north side of Burn, at an elevation of 100 feet. The natives here assured me that the same kind of "white stone," coral rocks, was found among the hills; and I have no doubt that it will be found in the mountainous parts of all the other Moluccas, as high up as Governor Arriens has already observed it at Amboina. A member of the Commission sent by the Dutch Government to examine the coasts of New Guinea, informed me that at the back of Dorey, on the north coast, at the mouth of Geelondk Bay, there are hills of very late formations, and that he found there a recent shell at a considerable elevation, 100 or 200 feet. From this point westward, as far at least as the northern end of Celebes, all the islands are probably rising.

Thus we find over all this wide area a repetition of the subsidence followed by an upheaval already noticed on Banda. Indeed, there is every indication that all the eastern part, if not the whole, of the archipelago is now rising, and thus we have before us the grand spectacle of a great continent forming itself at the present time.

2. *Letter to Major-General Sir Andrew Scott Waugh, on Routes between Upper Assam and Western China.* By F. A. Goodenough, Esq.

(Communicated by Sir A. S. Waugh.)

"My dear Sir,

"Understanding from our mutual friend Mr. John Fergusson, of Calcutta, that you are taking an interest in the discovery of lines of communication between India and China, viâ Northern Burmah, I venture to trouble you with some little information which I have gathered during a visit to Upper Assam in 1866, and from various other sources; and I enclose a rough sketch-map,* which will show you how short the distance is from British territory, on the one side, to the most westerly point attained from the China sea-board, viz., by Captain Blakiston, R.A., on the other.

"When in Assam I went up the Dehing River to the Terap for the purpose of visiting the coal-field there. I found that the inhabitants of a Singphoo village at the mouth of the Terap were in constant intercourse with the Hookoong valley of Upper Burmah, the locale of the amber mines and petroleum springs of that country, which they reached through passes in the Patkoi range. When there, some men from Hookoong (Beesa of the maps?) were on the spot, being about to take across some cattle.

"Inquiring about the distance, we were told that a man without a load could reach *Hookoong* in seven days, but that cattle would not complete the march under thirteen. The cattle of Assam, and especially of that part of Assam, are, from the coarseness of the herbage they feed upon, and inferiority of breed, &c., a most miserable race; and we may therefore fairly conclude that the pass or passes, across the Patkoi range are in no wise difficult. If they were so such wretched beasts as those which I saw—and the very cows about to be driven over were pointed out to me—would be incapable of undertaking the journey.

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* *Deposited in the Map-Room of the Society.*—[Ed.]

"Lower down the Dehing than the mouth of the Terap is a Fakeeal village, which I visited. The Fakeeals are Buddhists, and I found and inspected a temple there, and an establishment of Buddhist priests, who came from Burmah.

"From Hookoong (Beesa?) there are two routes by which we could proceed to China.

"*First.* In a southerly direction to Bhamo, the point of departure of the expedition under Captain Sladen.

"*Secondly.* Easterly, across the valley of the Irrawaddy, to the range of hills separating China from Burmah, through which I have always believed passes exist, and through which I have since, quite lately, heard that the Singphoos report that practicable passes *do* exist.

"It is of course unnecessary to point out that the route following the direct easterly course is much the shorter, if it really, as I must believe it does, exist. Following it, we should bring the Yang-tze-kiang within 300 miles of the Dehing; and we may venture to say that from Assam to the foot of the Chinese passes the country is practicable for a telegraph, or even for a road, whilst it also probably is so for a railway.

"The Irrawaddy, it is true, intervenes; but, as at the point where Lieutenant Wilcox early in the present century (1827) crossed it (only some 50 miles north of a direct line eastward from Beerah), it was only 80 yards wide, and fordable, it is not, probably, a very large stream where my proposed route would touch it.

"I was accompanied to the Terap in 1866 by Mr. Henry Lionel Jenkins, who has been engaged in tea-planting for the past fourteen years on the Dehing and thereabouts.

"Mr. Jenkins is a gentleman of birth and education, and he is possessed of more than ordinary intelligence and energy. He is well acquainted with the Singphoo chiefs, who are *quasi* lords of the passes over the Patkoi range, and is on friendly terms with them; and he was on one occasion invited by the head man of all to accompany him into Burmah, the *Gaum*—'Prince'—stating that he would guarantee his safety with his head. My friend was unable at the time to avail himself of the offer, to his great regret; but he could, I doubt not, get it renewed by that Gaum's successor at any time, if he received encouragement to make an expedition in the direction in question.

"I have now heard from Mr. Jenkins by the last mail, to the following important effect, viz.:—

"'I have given him (Captain Macdonald, Surveyor-General of Assam) the marches from Terap to Hookoong, and from Hookoong to Bhamo; but, as there is more than one path direct east from Hookoong to Yunnan, Bhamo is entirely out of the way.

"'Several Singphoos have told me that the Chinese do occasionally come up from Bhamo to Hookoong, but that by far the greater number come by more direct routes. Of these routes, however, I could obtain no certain information. I have got all the marches to Bhamo (twenty-two) from Terap.

"'Hookoong to Bhamo; perfectly level road.

"'Here is the Terap route, which is more precipitous than the Namchik route; but I have chosen the former, as it leads through large villages where supplies could be obtained. Namchik would be the route eventually for a road, but, until a road is opened, a party would travel easier by the steeper and longer, but more populous route.

"'*1st day.* From Terap Mookh to Hoongtam Naga village; long march.

"'2. To Youngbhee Naga village; over steepish hills. A long march; cross Umbang stream, about size of Terap.

"'3. Cross Terap and march to Yoglee Naga village; short march.

"'4. Mount and reach top of Patkoi range; long march.

"'5. Descend Patkoi; steepish. Cross Namphook small stream, reach Morang Naga village.

"'6. Cross Tilhee, size of Terap, reach Ishanghai village; short march.

"'7. To Wadapanee; small stream, a long march to reach water.

"'8. To Kaltâk village; a long march.

"'9. Cross Dâgâ and camp on Desang, both large streams. No village; moderate march.

"'10. To Soombogan, Singphoo village; long march.

"'11. To Hookoong; short march.

"'1. From Hookoong cross the Demai, larger than Dehing, and two other large streams, reach Jamboo Hill; a fair march.

"'2. To Lebong village, on the Noonkoong, larger river than Dehing, not a long march.

"'3 and 4. By boat down Noonkong to Namsang Mookh.

"'5. Land, and march to Santok hill; not a long march.

"'6. To Nunjhan; small river.

"'7. March down Nunjhan.

"'8. Continue down Nunjhan to Benankhoo; Singphoo village.

"'9. To Melankha village, on the Ooroop, large navigable river; short march.

"'10. To small stream; long march.

"'11. To Bhamoo; long march.'

"This is all that Mr. Jenkins says, but the particulars given are most valuable for the purposes of an exploring party.

"Up to this time I had always imagined that the route by Namchik, which place you will find I have marked in the map at the point where the Noa Dehing and the Booree Dehing diverge from the parent Dehing, was longer and more precipitous than that by the Terap, but, from what Mr. Jenkins says, the reverse appears to be really the case.

"Lieut. Wilcox went due east from Namchik, and got into a labyrinth of hills before he reached the Irrawaddy, encountering much difficulty in getting on, but I imagine that the route of which Mr. Jenkins speaks must go off southward, so as to evade these difficulties and get into the plain.

"I could say something more on this subject, and a good deal regarding the practicability of a railway up the Assam Valley from Rajmahal, but I fear that you would throw a more lengthy communication aside, and that the present one requires an apology on the score of its length is certain.

"F. A. GOODENOUGH."

3. *Expedition of Mr. T. T. Cooper from the Yang-tze-Kiang to Thibet and India.*

THE following letter appeared in the 'North China Daily News' of June 15th last, from the adventurous traveller Mr. T. T. Cooper, who started from Shanghai originally with the intention of reaching Assam, over the mountain passes which traverse the high range on the western frontier of China.

He communicated his plans to the Royal Geographical Society in August, 1867, and a letter of instructions was drawn up and forwarded to him by an Expedition Committee of Council, called for the purpose in October last.

Unfortunately these instructions, and a letter from the President which accompanied them, did not reach him before starting on his journey.

"Tai-tsian-loo, Western Borders of China,
"26th April, 1868.

"DEAR SIR,—Since writing you from the village of Hi-yan-su, a troublesome and dangerous journey of seven days brought us on the 9th instant, in company with the good Bishop of Thibet, Monsgr. Cheauvan, to this place. Our road for the first four days lay through a country similar to that about Hi-yan-su. On the morning of the 5th we arrived at Loo-din chow, a small town on the left bank of the Tai-tow-ho, a branch of the River Min at Kia-tung-foo, and navigable for small junks only 80 miles west of that place. This city is famous in China for its chain suspension-bridge, some 150 yards in span, built about 80 years ago. Crossing the river at this point we continued along its right bank, north for two days, the road winding along frightful precipices sometimes 500 feet above the river, the wall-like sides of the mountains forming gorges of terrible grandeur. At noon on our sixth day from leaving the Tai-tow-ho, we entered what is called the Tai-tsian-loo gorge or valley. This place, so I am told, is the most dangerous part of the grand route from Chen-tu to Lassa; to form an idea of it you must picture to yourself two mountains from 1000 to 1200 feet high, running parallel to each other, their sides perpendicular, and in many places overhanging the mountain torrent rushing in white anger at the base, their summits capped with snow, and a cloud of white mist throwing into this terrible gorge the gloom of twilight. The torrent (scarcely 30 yards wide), as it leaps on its headlong course to the Tai-tow-ho, washes in many places the narrow path running along its right bank with spray from numerous waterfalls; while huge boulders, forced from their resting-places high over head by the fierce hurricane which seems ever to sweep the bleak summits of these mountains, fill the gorge with the noise of a hundred thunders as they crash into the angry stream below: such is the Tai-tsian-loo gorge, at the head of which, thirty-eight miles west of the Tai-tow-ho, lies this border town of Tai-tsian-loo.

"The town Tai-tsian-loo divides the province of Sz-chuen from the Mandzu country, which extends to Kyan-kha, being so called in contradistinction to Tibet Proper, which commences only at Kyan-Kha (the tribes inhabiting this country generally speaking Tibetian, wearing the same costume, believing in the same religion, and being subject to Tibet), and is of great importance as an exchange trading mart. Thither come Shan-si merchants with tea, glass-beads, and tobacco, which they exchange with the Mandzus for hartshorn, gold, musk (from musk deer) and lynx, fox, wolf, and leopard skins, and a variety of a commoner sort, such as sheep, deer, and yak; this is the principal trade of the place. It is also of importance as a Chinese military station, containing nearly 1000 soldiers.

"As my next step onward will take me out of China into a country the trade of which can never be of great importance to my commercial friends in Shanghai, I will take leave of them with a few words relative to foreign trade with Western China. Many merchants in Shanghai told me that the exploration of the Upper Yang-tze and Western China was of no importance to their trade and sceptically asked me to prove to the contrary. I could then only point to the enormous wealth of Sz-chuen, its gigantic trade with Hankow in rhubarb, hemp, native medicines, sugar, and tobacco as exports, and cotton and piece goods as imports; all this was nothing new to them, and they looked upon my expedition as likely to result only in good pheasant or snipe shooting for myself. Even with the report of a meeting of the Royal Geographical Society extracted in your columns from 'The Times' of the 6th June, 1867, before them, and reading therein the importance which Sir A. Phayre attaches to the Burma trade with Yunan, they remained unconvinced. Many, however, warmly upheld my undertaking, and to these gentlemen I address the following remarks :—

"Chung-king, the trade gorge of four provinces, Sz-chuen, Yunan, Kwei-choo, and Chen-si, depends upon Hankow for the supply of foreign piece goods which it annually sends into these four provinces. The present junk transport on the Yang-tze between these two places, besides being extremely disastrous to trade on account of the total loss of many junks and their cargoes, is very expensive, and this, added to the Mandarins' squeezes, renders the price of foreign piece goods after leaving Chen-tu so heavy, that they are unsaleable beyond the Yang-ling range of the mountains near Chin-Chi-Chien, and this is the limit of foreign trade with Western China, numerous small rivers forming the arteries through which trade flows from Chung-king into Kwei-chow, Eastern Yunan and Southern Chen-si. The present trade between Chung-king and Yunan and Kwei-chow, is only temporary on account of the closure of the Bhamo and Tarli route and as sure as this route is opened, so sure will Burmah take to herself the trade of these two provinces and if, as is probable, British merchants establish at Ava, then a rivalship for the trade of Western Sz-chuen between China and Burma merchants seems almost certain,—the result telling probably in favour of the latter, both in export and import. Trade by this route has flourished before without European enterprise, and, as soon as it is re-opened, the trade between Hankow and Chung-king will be lessened by one-third. The Mahomedan Chief at Tarli has already established custom houses on the eastern borders of his territory, and at Hi Yan-sú I met several merchants who had come from Tarli and intended to return there to trade in spite of their having to pay Imperial and Mahomedan duty. Perhaps these facts are important for the Shanghai trade; if so, then the China merchants have but one object to gain, to attain equality with the Burma merchants by opening up the Upper Yang-tze to Chung-king. The Chinese authorities might be glad to checkmate the Mahomedan chief by this means. If the King of Burma abdicates in favour of British rule, that will place all India alongside of Western China, and no official mismanagement will cramp the energies and resources of the British merchant in Burma. For steamers properly constructed, and drawing not more than six feet of water, the navigation of the Yang-tze to Chung-king is possible. At the lowest winter level (Jan. 1868) known for some years, there were seven feet of water at the lowest rapids.

"As to the route between Sudiya and Likiang, this in Shanghai seemed to me practically useful for the Calcutta trade with China, but I am constrained to admit now the fallacy of such a hope, and this admission is based upon the following remarks of Monsgr. Cheauvan, who resided for many years in the neighbourhood of Tarli and Likiang. He tells me, 'Likiang is a name only, the place whereof is marked by a few small houses near the foot of the Snowy Mountains, which are impassable on account of perpetual snow and want of passes, while the Lao-tsan and Now-kiang rivers are fierce, unnavigable, and unbridged; the country through which they flow being inhabited by savage tribes constantly at war with each other, and beyond this in Bing there is another obstacle in the Pat-koi range. Admitting, for the sake of argument, that a practicable route could be found, the goods which Calcutta would send to China, Burma would send at a less cost. No! India has a brighter prospect in store for her trade with Tibet, and this must flow either through Nepaul to Lhassa or by Sudiya to Bathang; the latter route, however, having to pass the Himalayas and a dreadfully hilly country to within a short distance of Bathang. At Lhassa there are already over 3000 Nepaulese *trading in* European goods, while, to deal in the figurative, the rivers of *Bathang run with* gold.

"For the information of my sporting friends in Shanghai, I may tell them that so far my bag consists of one wild goose, shot near Hankow, my journey to this place having been through a country destitute of game.

"Up to this time I have cherished the hope of being able to reach Sudiya from Bathang, but important considerations force me to abandon the idea. Without instruments and funds I cannot and dare not penetrate the unknown country between these two places. With the help of Providence I will reach Lhassa, where, disposing of my mules and ponies, I will foot it to Khatmandoo, hoping at some future time to accompany a proper expedition through this country.

"Nothing can exceed the kindness of the Catholic missionaries in China, especially Monsgr. Desflech, bishop of Chung-king, and Monsgr. Cheauvan. To the latter I shall ever owe a deep debt of gratitude, while to the united help of the French and Italian Catholic missionaries generally I am indebted for the pleasure of being at this moment on the western borders of China.

"Personally, with the exception of a slight cold and profuse perspirations at night, I have nothing to complain of, or rather feel that it is of no use complaining; otherwise I might fill pages with grumblings at martyrdom from vermin, bad housing, the pardonable tyranny of my Chinese interpreter, and wretched food.

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My journey from England began under bad auspices, for at Southampton they discovered my photographic materials and refused to admit them on board; however, that loss was not serious. On arriving here about the end of June, I found things much changed for the worse: there were no Bolivian Indians, whose services would have enabled me to ascend the Purus; the Consul had given orders to have them laid hold of whenever they turned up here, and sent to Bolivia, on the plea that there are more than 2000 now scattered about the Amazons, and that the lack both of their labour and of their poll-tax was felt in Bolivia. The Brazilian authorities executed his orders pretty strictly; so I found I had no chance of a crew of Bolivians. In any case, however (as perhaps I said to you in England), it was too late in the year to attempt ascending

to the Beni with much hope of success, and under the circumstances impossible. Accordingly, I went by steamer up the Amazons to Teffé to try the Juruá.

I travelled about three months up the Juruá, which is about 25 days' journey beyond previous explorers *on the main river;* the distances I have not yet added up, perhaps they may come to something between 1000 and 1200 (English) miles; my farthest point was about 7° 12′ s. and 72° 10′ w. The journey was cut short by an attack of Nauas Indians, who in past times used to make forays far below, and have long been the bugbear of the upper Juruá, both to white people and Indians; they are notable for the use of large round shields of tapir-hide. We were in no danger at all in the skirmish we had with them; but my men, recollecting the recent and serious attack on the Government expedition up the River Javary, were, with but one exception, unwilling to continue up-stream, and I had no means of making them do so; already I had been forced to put all the oars at night under the awning, as twice they were thrown away in the hope of thus stopping the journey. No doubt there was a good chance of danger, as an up-stream canoe must, as you know, travel along the bank, and ambuscades are easy: still we ought to have tried the thing, and I shall always look back with shame on our return. The river there was still a considerable stream, 130 to 150 yards wide, and in flood 5 or 6 fathoms deep.

The *main Juruá* does not approach the Purûs, unless it be quite at the sources of both rivers: it is the Tarauacá, an affluent of the Juruá, and the only large one which rises near the Purûs. João da Cunha and a good many drug-collectors have been up this river. The course of the Juruá, as might be expected, is very different from that given in maps; above lat. 6° 30′ s. its *up-stream* course is mainly west; that is, for 40 miles of southing it makes about 3¾° westing. In fact, the course of all the rivers between the Madeira and Ucayali have probably this character. Captain Costa Azevedo, the Brazilian chief of the Boundary Commission with Peru, tells me that the River Javary has a similar direction. The farthest point they reached was in about 6° 50′ s., and the river there a small stream, a mere brook, so that he doubts if it rises more than a few miles, if at all, to the south of 7°. By a treaty just concluded with Bolivia, the boundary between that country and Brazil is to run from the mouth of the River Beni to the source of the River Javary.

From Teffé I came down to this place in a canoe, and since then have made a trip to Maués,* and up the Maués River and one of its affluents to the falls or rapids of each; this was a mere excursion, still I mapped out the river and took observations so far as weather allowed. Probably I shall remain here till the end of May; then I wish to start for the Beni—I hardly venture to say "hope," for the difficulties of getting a crew, especially for two canoes, are very great, and with but one canoe the chance of successful exploration very small. There are two German engineers (J. and F. Keller) sent here by the Government to examine the falls, &c., of the River Madeira, and the probable expense, &c., of canalisation and making a road. They purpose starting at the end of April; but to get these men the President has been obliged to solicit the aid of the Bolivian Consul, which does not make my chance better.

W. CHANDLESS.

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* An affluent of the right bank of the Amazons, between the Madeira and the Tapajos, and discharging itself into a large side channel of the river.—[ED.]

5.—*Notes on the Physical Features of Belize.* By A. S. Cockburn, Esq.

(Communicated by the Colonial Office.)

On a flying visit of a few weeks along the southern coast, about a month ago, I was afforded a hasty opportunity of examining the geological formation of a portion of that part of the colony. From the short time at my disposal I could only touch at a few spots between Point Hicacos (the proposed site of the new city Austinopolis) and the Carib village of Punta Gorda, of which I now propose to give a slight sketch in continuation of my former report.*

I found the prevailing type to be still of the tertiary period, but consisting of a system of rocks more consolidated and crystalline than those bordering the River Belize, on which I lately had the honour to report.

The whole coast from Sihun to the Sarstoon, embracing an extent of 103 miles, is intersected by no less than 23 rivers and creeks, besides several lagoons or inland lakes, which bring down a great quantity of mud and silt into the Gulf of Honduras, and more or less affect the kays and banks within the circle of that great barrier-reef which fringes the gulf, and marks the boundary of the blue waters.

The range of mountains beginning at Sihun and running nearly parallel with the coast, clothed with verdure to their summits, seem to be formed on calcareous matter, and appear no farther than two miles from the shore; but there are others, veiled in mist, rising behind higher and higher, at right angles to the coast-ridge, in amphitheatral form, whose conical shapes proclaim them to be volcanic. These give a very picturesque appearance to the landscape, and the whole was quite a treat to one long confined to the everlasting mangrove-swamps and deleterious marshes of the Belize dead-level.

On entering the splendid harbour of the "Seven Hills Estate," the seven hills conspicuous in the distance, the little kays and islets rising out of the clear water like so many emerald gems, crowned with coconut-palms bowing their plumy branches like ostrich-feathers waving in the wind, formed quite a miniature archipelago. There is excellent anchorage all along, and wells of splendid water on several of the islets; and in the basins formed by the surrounding kays and reefs the sea is as placid as an inland lake, and many little harbours of refuge are naturally created, where vessels might ride in safety, perfectly protected from the raging of the elements.

The formation is regularly stratified, and consists of a compact indurated argillaceous limestone, deposited in laminæ or successive layers between their beds of very fine clay, like immense slabs of flagstone, dipping under the water at the coast, and extending several miles inland, originally horizontal, but now tilted and wavy, fractured and dislocated here and there, where the land has been uplifted into ridges and hillocks, the whole covered with a stratum of clayey loam of varying thickness, and overtopped in some places with a rich black mould arising from the decayed droppings of the primitive forest; in others superimposed by a layer of sand forming the pine and cahoon ridges.

In some places the shore is still a marshy swamp covered with mangrove-bush, tall rushes, reeds, and swamp-grass, which conceal the river-banks, and the rank vegetation extends down to the sea. In others, again, there are sandy beaches upon which the Caribs build their villages, and where the land slopes up gently inward, and the rivers run upon pebbles and clean brown sand; but the soil is comparatively sterile, as at Hicacos, where the sandy soil and broken ridges prevail up to the lagoon, some two or three miles in the interior.

At Punta Gorda the land rises abruptly in a sort of ledge five or six feet, and the beach is strewed with a shingle consisting of large fragments of coral, flint, and feldspathic rock, mixed with a coarse gravel-like capelli,—the pieces still rough and angular, and scarcely water-worn, as if brought by the waves from no great distance; and accordingly, on further examination, I found the ledge to consist of an out-crop of conglomerates, composed of the same sort of rocks stuck in a bed of clay, like a coarse pudding-stone, but comparatively soft.

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* See 'Proceedings,' vol. xii. p. 72.

In the immediate neighbourhood there is a little stream of limpid water, called "Tom Taylor's Creek." I do not know how far inland it runs; but I am told it joins a lake about two miles in the interior. I paddled a mile up this creek to the base of the small hills in the background, where I found the stratification more fully and clearly developed.

The stream runs upon a bed of the laminated limestone, and as the ridges are approached the layers become tilted and broken, and the jagged edges of each lamina project on either side and under the stream; the intervening seams of clay being washed away, the layers come out clear and clean, showing through the transparent water the nature of the deposits. At the point I reached it was tilted at an angle of 10°, the dip being north and south, and the strike east and west, as if the strata were dislocated in the line in which the stream now runs, purposely to make an opening for it. The passage, however, is not formed by the erosion of the water, but evidently by a concussion of nature of some considerable force, which lifted the land and elevated the hills long after the limestone had been formed and consolidated under the sea.

The rock is a compact marly limestone, with a little iron oxide, in laminæ of from two-tenths of an inch to two inches thick, internally traversed by veins of calcareous spar. In other places it is met with in blocks or amorphous masses with distinct crystals aggregated together in amygdaloidal nodules and permeated with the carbonized remains of decomposed seaweeds and other vegetable matter. It is of a dirty white or greyish colour when first taken up, sometimes variegated with patches of pale pink, but bleaches white on exposure to the atmosphere. Some of the slabs, almost in course of transformation into a beautiful description of marble, would make excellent paving-stones for door-steps, &c.

At Seven Hills Estate the hills, nearly equidistant from each other, range off in a somewhat irregular line, bearing south-west from the coast, and are of the usual dome-shape peculiar to the calcareous formations; they are all about the same altitude (500 to 600 feet), and the valleys between them 1000 to 1400 broad. Two of the hills are rather elongated (saddle shape), and on the ridges the slabs or layers incline at an angle of 70° on either side along the anticlinal angle, while on the apex of the domes they dip around the circumference, forming what geologists call the "*qua-qua angles*," all splintered and shattered into a thousand pieces. As partial denudation has taken place, the exposed portions have become bleached in the sun and air, and at a distance appear like fragments of broken china scattered over the surface. The valley is partially cultivated, and produces some of the most luxuriant sugar-canes I have ever seen (and I have travelled through the sugar-plantations of many of the West India Islands), some 16 feet long, by 6 and 8 inches in circumference, and in very thick stools. The soil is a thick layer of clay resting upon loam, soft and moist-cutting like cheese, and underlying a fine black mould washed down from the hills. As the washing will give a constant supply of the carbonates, the silicates, and the phosphates arising from the decomposition of the limestone, those valleys will remain always fertile, and will ratoon over and over again for years without becoming exhausted.

It does not appear that the laminated formation extends to the kays, for most of them near the mainland are composed of the mud, gravel, and sand brought down by the rivers, and which have become covered with the mangrove-*bush and remain half* submerged, as the "bouges" and the "drowned kays,"

&c.; while in others, more solid and higher out of water, these accumulations of silt and débris seem to form the foundation upon which the coral-insects have raised a superstructure. I have dug 10 feet deep on the island of Turneffe, at 200 yards from the sea, and found nothing but loose calcareous sand identical with the beach and the sea-bottom of the place; while Calabash Kay, not 500 feet distant on the east and nearer the barrier-reef, is bounded on the side next the reef by solid rocks of porite coral, meandrina, and honeycombs, &c., the channel between the two islands being deep and free of the coral-building polypifers.

Near the mainland the water is turbid, and the floor of the sea is covered with soft mud; and in some places, as at the mouth of the Manatee River, with coarse gravel and silicious sand, but more to seaward it is of white calcareous sand. At the estuary of Belize, within the bar, the dredge brings up nothing but mud mixed with ferruginous sand and dead fresh-water and marine, littoral and estuary, shells; but the farther you recede the clearer becomes the water, and the cleaner and whiter the sand, which consists generally of comminuted fragments of corals, shells, sponges, remains of crustacea, &c., in all degrees of fineness. The sand at Point Placentia, and some other places, is brown siliceous, consisting of fine particles of flint and granite, and in other places of mica, quartz, and other hypogene rocks; and the beach of several of the islets is covered with the remains of sea-eggs (sea-urchins, *echini*, and other *echinodermata*), and various species of shells of all colours, prettily mottled and variegated, some of them exceedingly minute and beautifully polished, as at Water Kay, &c. In others, again, sponges, sea-fans, pumice-stone, algæ, and other sea-weeds, are scattered about; while the conch and the star-fish, the lobster and the crab, and other *radiata*, *crustacea*, and *mollusca*, are seen through the transparent water quietly resting below, or browsing on the marine flora of the deep; and the whelk and the cockle enjoying the genial rays of the sun on the exposed rocks forming the "iron-bound coast;" immediately behind which is the deep perpendicular gulf covered over by the almost unfathomable dark-blue water of the ocean.

Some of the kays are round and oval, but the majority are more or less long and narrow, flat, and low, not unlike the "atolls" described by Darwin as appearing in the Pacific Ocean; but I am unable to state whether they are increasing or decreasing in area. Darwin says, "In those seas where circular coral-islands abound, there is a slow and continued sinking of the submarine mountains on which these masses of coral are laid, while in other areas of the South Sea where coral is found above the sea-level, and in inland situations and where there are no circular or barrier reefs, the land is on the rise." I believe these kays fluctuate in size and elevation, oscillating, alternately sinking and rising. At one time a portion is washed away by violent storms or the action of the current, and the area becomes seriously diminished; at another the tempest and the waves bring up a great quantity of sand, shells, and other débris, and the island retrieves itself, and, by the operations of the industrious untiring coral zoophytes, becomes renovated and enlarged. Though volcanoes are not far off, shocks of earthquakes are seldom felt in this alluvial bottom; but still they must have some subterranean influence, and the débris of the neighbouring volcanoes is brought down by the rivers, and pumice-stone is often seen floating about in the sea or resting on the beaches of the kays around.

St. George's Kay, about nine miles north-east from Belize, with a lagoon to leeward, and based in a crescent-shaped reef measuring 1113 yards in length by 630 in breadth, appears to have been sinking for some time. It was inundated by the hurricane of 1813, and since then it has suffered two similar catastrophes, in 1827 and 1864, and the sea on the last occasion divided it into three distinct parts. It recovered itself somewhat after the waters had subsided; but still every tide cuts it very nearly across at the former divisions, and on both sides it is evidently fast washing away.

South Snake Kay, however, is an example of the gradual increase of a coral-island. Here the attentive observer may see clearly the palpable operations of the little tiny insects labouring hard at the construction of their stony habitations. The island is 98 miles S.S.W. of St. George's Kay, of an oval form, measuring 880 feet one way by 400 at the broadest part, and about 4 or 5 feet above the water-level, surrounded by a white, glittering, sandy beach, dry, destitute of the mangrove-swamp, and covered with vegetation and several full-grown coconut and other fruit trees, and frequented by the wild pigeons and other birds, who feed upon the fruit and nestle there in the breeding season.

At the margin of the vegetation is the stem of an old dead guana-tree, measuring 22 inches in circumference, the lower part of which is perforated with holes to about a foot upwards from the ground. If this was done by the Teredo worm, it shows that some time or other, after the tree had fully grown (how long ago it is impossible to tell), the land must have sunk that depth under the sea, and that since then the sea has receded or the land risen.

The guana lives to a great age, but this does not appear to have been very old when it was cut down; and I am not aware that it grows in the water, or affects swamps or marshy places. Be that as it may, there is the stump now, 4 feet from the edge of the water, a monument and a mark to answer the next visitor whose aspirations may lead him thither to interrogate nature in his researches after scientific truths. The first two feet from the stump towards the sea, all around the island, is covered with blocks of coral and a mass of drift-wood, with barnacles, dead sea-weeds, and other waifs and strays thrown up by the sea, and the other two feet to the water's edge is of fine white sand. The tides do not now reach this mass, and, should any storm arise, the sea would only drive the débris higher up, and cover it with sand, &c., making room for other accessions of drift. At present the 4-feet beach forms a circle round the island gently sloping towards the sea, and at about 15 to 20 feet from the shore, the minute *Lithodomi*, *Milleporæ*, *Meandrinæ*, *Astreæ*, and other lamelliform polypifera, are hard at work, in 2-fathom water, patiently and persistently building their mural escarpments and beautifully coloured coralline groves, which spread out into fans and ramify into trees, their varied and elegant forms mingling and blending together, and the ever tremulous water, clear as crystal, reflecting their splendid hues like so many flickering rainbows. On these structures reaching the surface, the little zoophytes leave them and descend to the bottom to secrete fresh matter, while the waves, or the current, or the tempest, will break off the fragile branches and waft them to the shore, thus continually adding to the *detritus* of the beach, and increasing the area of the island. Even now the rain, percolating through the mass, disengages carbonic acid, which, acting chemically on the lime and the silica, &c., cements the whole into a compact solid mass; and in a few years, provided no subsidence takes place in the mean time, vegetation will cover the place, and the island be permanently enlarged. This is Nature detected, as it were, in the very act of her mysterious elaborations.

Here we anchored in 4 fathoms water, at 100 yards from the shore, and the armed lead brought up fine white sand, consisting of triturated corals and shells. How long safe anchorage will continue at the same distance (the rock-forming architects always advancing seaward) future observations will show.

I cannot conclude this report without referring to an extraordinary display *of the luminosity* of the ocean which occurred while we were quietly anchored in this little cove, the appearance of which was surprising and beautiful in the last degree. It was about 8 o'clock on the evening of the 21st of August, the sea was calm and smooth as a millpond, the night clear and serene, but the stars, though not dull, did not shine with any peculiar brightness. Presently, a smart breeze set in from seaward, and, being against the tide, a chopping little sea arose, and immediately our placid millpond became a fretful lake, spluttering and bubbling like a caldron of molten silver. Every ripple, every wavelet, was transformed into a flaming brush of sparkling phosphorescent light, and the spray fell on the deck and around the vessel in brilliant scintillations of liquid fire, producing a most magnificent effect! This continued for about two hours, when the scene changed. I fancy it requires a peculiar state of the atmosphere to form the display of this phenomenon, for it was not a dark night, neither was it a very clear one. The moon was absent, and in the horizon were gathering electric clouds, which gradually crept up to the meridian, slowly enveloping the heavens with a funereal pall of threatening aspect, and about 10 o'clock the whole firmament was overcast. The wind abated, the luminosity ceased, and the waters reflected only the blackness of the night in striking contrast with the former brilliancy; suddenly vivid flashes of lightning shot up to the zenith, and spread out in sheets like the aurora borealis. The peals of thunder reverberated above and below, till the vessel itself seemed to tremble on the face of the water.

This continued until midnight, when copious showers of rain succeeded, and drove me into the cabin.

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AND
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Issued July 15th, 1868.

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